AVIATION

The Oldest American Aeronautical Magazine

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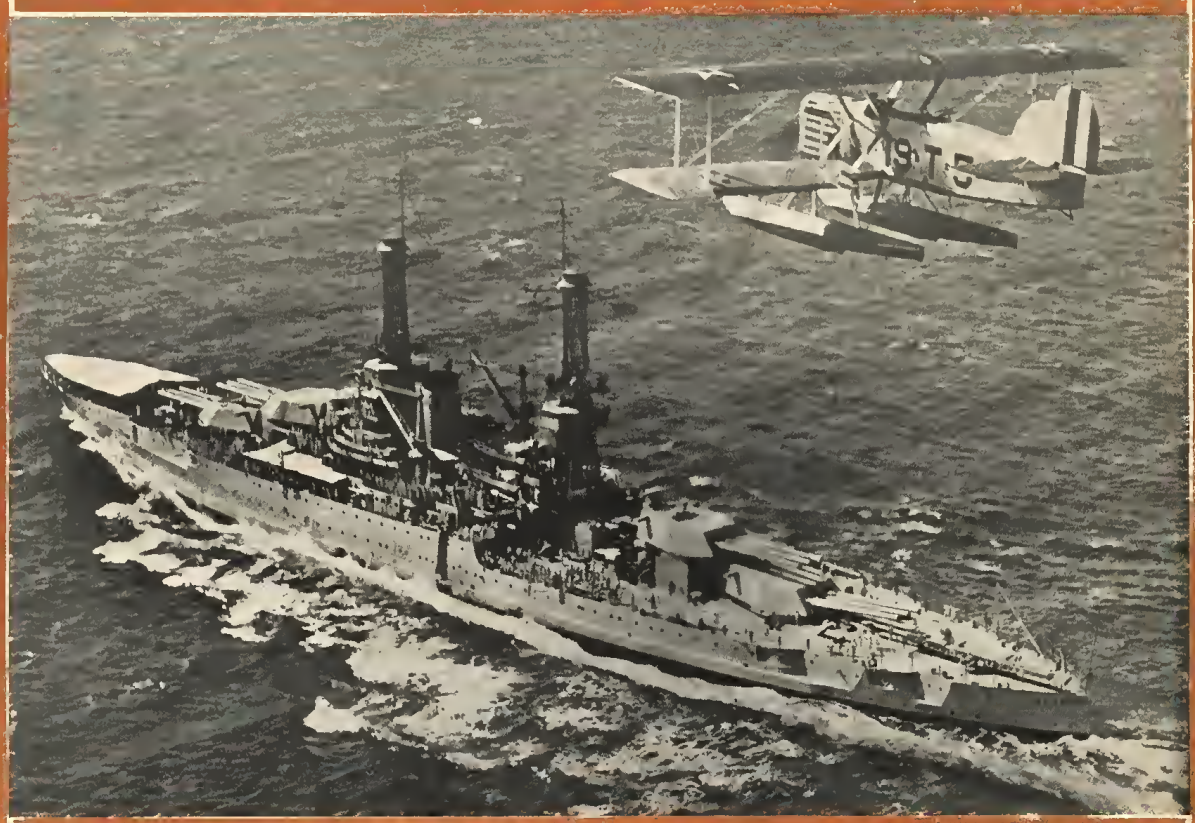

A Position of Vantage over the U.S.S. Idaho

Wide World Photo

VOLUME XX

NUMBER 8

SPECIAL FEATURES

DIAGRAMATIC BENDING MOMENT CALCULATIONS

SUCCESSFUL SPAIN-ARGENTINA FLIGHT

RADIAL AIR-COOLED ENGINES

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Air Regulation

HOPING THAT some helpful information might be secured at this time, when air legislation that will place the control and regulation of commercial aviation in the Department of Commerce, is pending, AVIATION wrote to Secretary Hoover, asking for a statement of the policy that might be expected from his department. The answer, which, as was to be expected, was in general terms, should be reassuring to those who have believed that regulatory measures might be very strict if placed in a Federal bureau.

The letter, that we wrote, was as follows:

> We have been receiving from airmen and aircraft operators their opinions as to regulation. Much of the objection to this proposed control of aircraft and pilots is, in our opinion, based on the fear that it will be so severe that it will limit the development of flying rather than encourage a wider use of aircraft in commercial work, including air transport.
>
> We have looked over your testimony before various committees on this subject and cannot find what we consider to be a clear statement of your views. This is undoubtedly due to the fact that you were not asked to give it.
>
> At this time, when there is so much discussion on regulatory measure, your views as to the extent that you believe such direction should be carried, would be very helpful. If you would state to what extent you feel pilots should be examined, how far aircraft should be tested, and what general rules should be placed on flying fields, we feel sure that all interested in this most important subject would be gratified.

As the President's Air Board recommended that the immediate direction of aeronautical matters should come under an assistant secretary, it was proper that the policy of the department should have been stated in the reply by Hon. J. Walter Drake, Assistant Secretary of Commerce, who replied as follows:

> I have received your letter of February 6th, addressed to Secretary Hoover, in which you request an expression of views as to the policy the Department will follow if called upon to administer regulatory legislation relative to civil aviation.
>
> Governmental regulation of civil air navigation is primarily necessary for the purpose of protecting the public, and if properly applied, will tend to creat a public confidence in air navigation and, therefore, materially aid in the development of commercial aviation. The proposed legislation gives authority to the Department of Commerce to administer regulatory laws very similar to those now applied to the merchant marine. I do not find that there is a feeling that the Department's administration of the latter laws has operated to the detriment of the merchant marine, nor is there any ground for fear of injurious over-regulation in the case of commercial aviation.
>
> The Department has followed the policy of seeking the advice and assistance of those best qualified to interpret the needs of industry and business in general, and has endeavored to direct its policy to meet such need when so interpreted. You may be sure that the same policy will be followed in the development of civil aviation. To this end the Department will seek the assistance of those who have taken a leading part in promoting, and are best qualified to interpret, the needs of civil aviation, and it is expected that they will cordially assist the Department in promoting this enterprise. If there is any possibility of over-regulation, it can be avoided by such cooperation.

This clear and encouraging statement should cheer those who are fearful that there would be put into effect stringent rules that would put many of the pilots now making a business of aerial service, out of employment. If the term "aerial service" had come into general use earlier, with its clear definition of a distinct field from air transport, much of the difficulty that now faces the pilots and operators would have been avoided.

Up to the present, those who are not well acquainted with the extent of the aerial service in this country or have confused it with the Gypsy flier's activities, have sought their advice almost exclusively from military pilots, air transport exponents and aeronautical engineers. The commercial pilot or operator has not been sought out for advice and counsel. It, therefore, is opportune to call attention of the Department to this apparent oversight and suggest that, when the suggestions from those interested in aircraft regulation are asked, there be three representative air transport operators, three aircraft operators and three commercial pilots invited to the conference. In this way, all opinions will be heard and the practical views of those who are to be controlled will be given a fair hearing.

The Collier Trophy Award

THE COLLIER TROPHY for 1925 could not have been awarded for a more worthy achievement than that of the production of the Reed metal propeller. The Reed propeller is known all over the world and, in addition to being a standard of equipment in Service airplanes here, is used extensively abroad. Much of the responsibility of winning for and maintaining in the United States, the speed records of the world, belongs to the Dr. S. Albert Reed through the use of the propeller on the Curtiss racing planes, and the all round excellent characteristics of the Reed propeller continue to maintain for it a world-wide reputation.

Aviation and Confidence

President of the Guggenheim Fund Emphasizes Colossal Future in Commercial Aviation

By HARRY F. GUGGENHEIM

THE PROGRESS of aviation will in the last analysis depend upon the confidence in which the people hold it. The comparatively quick increase in confidence in navigation in a new medium has been extraordinary.

The civilized world today accepts the airplane, and its use is no longer dreaded, so that we are very slowly but surely becoming "air minded." This is particularly so in Europe, where air travel is no longer something extraordinary, but a part of the daily lives of the people.

To the use of the airplane as an implement of war we can attribute the abnormal growth and development of aviation during the war years. But like most products of the war, a period of reaction followed during which aviation not only ceased to progress but retrogressed. It has been like those spring flowering plants that one sees in the florist's window in full bloom in mid-winter. They have been forced to bloom in a hothouse ahead of their normal time, with the result that often the plant either dies, unless given great care, or at least several years elapse before it will bloom again.

War Planes Bad in Commerce

The types of aircraft in use today for industrial aviation are not in most cases those types produced for war purposes but in some cases are the actual craft themselves left over from the war or rebuilt from war material. These types are for the most part ill-suited for industrial purposes and are merely make-shifts which are all that the struggling industry has been able to afford.

Briefly, the disadvantages of the dirigible in comparison with the heavier-than-air-craft are their slower speed, lack of maneuverability in high winds, great initial cost for ship and ground facilities and heavy operating expenses and large numbers of personnel required. Two to three hundred ground men are necessary to land a dirigible. On the other

Harry F. Guggenheim, Pres. Daniel Guggenheim Fund for the Promotion of Aeronautics

hand the dirigible is in the present development of aviation the only practicable means of accomplishing a long non-stop commercial flight like the crossing of the Atlantic Ocean. I don't mean that such a commercial flight in heavier-than-air craft may not be within our reach in the near future, but it is certainly not practicable today. The use of non-inflammable helium gas in place of hydrogen has greatly increased the safety though also the cost of operating airships.

The tragic fate of the Shenandoah is a fresh, ghastly memory. From this particular catastrophe or from any particular catastrophe in the new art of aerial navigation, we should learn our costly lesson, but we should not attempt to dogmatize or even generalize. There are so many opportunities for catastrophe from faulty construction and from the human quality of making mistakes that we must continue to place our confidence in fundamental aerodynamic principles in spite of incidents that *a priori* might tend to shatter that

Rear Admiral H. I. Cone, Vice Pres. and Treasurer of the Guggenheim Fund

confidence. Although my own training, as a naval pilot, has been in heavier-than-air craft, I believe that other things being equal under most conditions lighter-than-air craft are perhaps safer to life than heavier-than-air craft. I say this in spite of the fact that the only war flight that I ever made in a dirigible very nearly ended in a total loss to all hands and to the airship.

The Requirements of the Commercial Plane

The design of an airplane to have certain characteristics, is not an easy matter. There are certain limits to which the designer at the present state of development of the art is confined. Certain characteristics can be improved, but at the sacrifice of others. The desiderata for war are not the desiderata for industrial aviation. To sum up in another generality, the characteristics that the war time designer had constantly in mind were speed, climb, maneuverability, and care to avoid "blind spots." Quite different are the characteristics needed for industrial aviation. They might be summed up as follows: Safety, economy both in construction and operation, ability to carry a large "pay load," and moderate speed. I use the term moderate speed in comparison with speeds developed for war purposes. One of the most important commercial features of the airplane is its great speed, but this speed is in comparison with the motor car and railroad.

There would have been one outstanding exception in airplane war development to what has just been stated had the war lasted longer. That was in the naval aviation anti-submarine warfare. We were on the verge of a development along present day commercial airplane lines thanks to the German submarine for the following reasons: Our naval aviation bases were established on the coasts of France, England, Ireland, and Italy, wherever shipping needed protection from the predatory submarine. The final development of anti-submarine warfare was not the promiscuous search for submarines, the success of which was more difficult than finding the proverbial needle in the haystack, but the "convoy system."

This system involved assembling merchantmen and transports in as large fleets as practicable and convoying them, that is, escorting them under protection of war craft from port to port. As long as the German submarine did not molest the convoys they might roam the seven seas at will as far as the Allies were concerned.

The activities of the submarine were greatest within a few hundred miles of the coast, where all convoys necessarily started to head for port. From the convoy system we soon learned that we must develop aircraft to meet and successfully fly with the convoys as far out at sea as practicable to escort them to port, and also to fly successfully with the coastal convoys as long as possible. These considerations meant the development of a plane with characteristics comparable with the present day needs for industrial purposes.

Aviation Without Subsidy

American industrial aviation has suffered temporarily more than aviation abroad. This has been due to a policy of direct governmental subsidy, or, in other words, money grants established in England, France, Germany and Holland. Also the governments of Switzerland, Hungary, Roumania, Poland and Denmark are contributing to the support of aviation. Subsidy for infant industries is a traditional method of governmental encouragement and assistance for industry in Europe, but by tradition, contrary to the policy of our government. In the long run I firmly believe that American aviation will be benefitted by not having had a direct governmental subsidy. Direct subsidy is a means of forced development that is quite likely to impair healthy growth and to defeat the very object sought, viz., the establishment of the industry on a sound economic basis. In Europe subsidy has not been conceived solely with the economic development in view, but there is joined with it a political significance.

What the future will bring forth we do not know, but today European industrial aviation is not on a sound business basis.

Need for Indirect Assistance

Although perhaps we in America are fortunate in our governmental policy of *laissez faire*, in so far as direct subsidy is concerned, in other respects our industrial aviation has suffered greatly through lack of adequate legislation for the usual government protection and indirect assistance due to industry.

From all indications at the present time we can look forward not only with hope, but with confidence that governmental action for assistance to aviation is at hand. Legislation should be the next force to start American industrial aviation to the fore.

At the present moment, with the one brilliant exception of the U. S. Air Mail, America is far behind Europe in industrial aviation.

In the operation of regular air transportation services in Europe for 1924 the number of miles flown was 5,927,356.

Against this the United States, except for our air mail, has not one regularly established route that can be considered out of the experimental stage and comparable with these European developments. A sad commentary on our great and prosperous industrial nation, whose heritage it is to lead the world in aerial navigation.

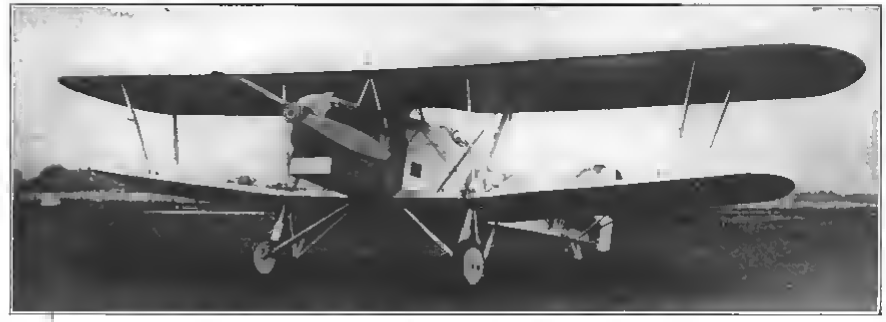
The Tremendous Future

The possibilities in industrial aviation are beyond our limited vision and our imagination. If we are alert we get an occasional picture of the future from some statement or fact that gives us momentary sight like the instantaneous picture we get from the lighting of a dark road at night by a flash of lightning. The president of the American Express Company recently stated that there were shipped at times in 24 hours from New York City alone five hundred carloads of express. That statement is an illuminating one. Five hundred carloads of express matter a day from New York City alone waiting for a quicker means of transportation than the railroad! Can any marshalling of statistics do more to fire the imagination than this simple statement of an isolated fact in the great world wide movement of industrial aviation? The railroad must give way to the airplane as the horse and carriage gave way to the railroad. However, I do not conceive the airplane today or for many a future day as a competitor of the railroad but as an auxiliary to it.

Pioneer Responsibilities

The pioneer in industrial aviation has great problems before him but I think they are in most respects insignificant in comparison with those that confronted the railroad pioneer, only half a century ago. The first transcontinental railway line in North America was completed in 1869. The greater part of the line ran through a country for the most part uninhabited. The airplane pioneer has few of the problems of the road builder, such as expensive engineering surveys, roads and bridges to build, mountains to tunnel and maintenance of roads. The airplane pioneer has at his hand a highly organized industrial area awaiting his coming. In contrast, in order to create business for his road, the great railroad pioneer, J. J. Hill, was found to give away to the farmers seeds, cattle and land.

Industrial aviation will have its own peculiar problems that will require unusual talents and strong wills to solve. Let no one enter this field as a pioneer unfortified by the ideal of service to humanity, for here as before fortunes will be lost, faith weakened, ambitions shattered; and not all will travel the road of success.—*N. Y. University Alumnus*



An up-to-date British day bomber,—the Hawker Hawsley which equipped with a 650 hp. Rolls Royce Condor engine has a speed of 100 m.p.h. with a full load.

The Spain to Argentina Flight

Eighth Air Crossing of Atlantic Successfully Achieved and Spain and Argentina Brought Within 61 Hours of Each Other.

IN SPITE of having pieced the most difficult and hazardous portion of their flight—the Atlantic crossing—behind them, upon their arrival at Pernambuco on Jan 31, after the short hop from Fernando do Noronha, Comdr. Ramon Franco and his companions still had between two and three thousand miles to cover in their flight from Spain to the Argentine. While at Pernambuco, the new propeller which had been sent on to replace the one damaged during the night out in the heavy seas off Noronha, was fitted and, owing to a mistake made in the refitting, it was impossible to resume the flight until Jan. 4, when a start was made at 5:15 a. m. for Rio de Janeiro, Brazil. The distance of 1264 miles was covered in 12 hr. 10 min. leaving only 1382 miles separating the fliers from their goal at Buenos Aires.

Down the Brazilian Coast

Many watched the flight from Pernambuco, for the Dornier Wal seaplane, which is being used, passed over numerous towns. Maceio was passed at 6:30 a. m., 1¼ hr. after the start and the distance is about 140 miles, while Aracaju, nearly 300 miles from Pernambuco, was passed at 7:35 a. m. Bahia was reached at 9:05 a. m. and flowers were dropped over the city. Bahia is 450 miles from Pernambuco. At 11:30 a. m. Porto Seguro was reached and Caravellas was crossed over at 12:40 p. m. At 2:45 p. m., Victoria was passed and this town is only 270 miles from Rio de Janeiro. Shortly after word had reached the Brazilian Minister of Marine that the fliers were near their destination, a squadron of airplanes was dispatched from Rio de Janeiro to meet the Ne Plus Ultra, which was sighted off the latter city at 5:10 p. m. and made a safe alighting fifteen minutes later.

Committees representing the Spanish communities of Rio de Janeiro, Santos and Sao Paulo met Commander Franco and his company at the landing stage. The Sao Paulo committee brought a solid gold platter encrusted with precious stones, as a gift to the leader of the flight.

Several days were spent at Rio de Janeiro prior to taking off for the last leg of the proposed flight, a distance of 1382 miles, to Buenos Aires. It had been decided not to attempt the whole of this in one hop but to alight for a short while at Montevideo. This would entail a flight of 1200 miles, after which the remaining distance would be covered in an hour or so. Accordingly, Rio de Janeiro was left at 7:21 a. m. on Feb. 9, after a short test flight to determine whether everything was in order for the long flight. The plane disappeared in the direction of Santos and passed over that city at 10:58 a.m. A successful landing was made at Montevideo at 7:25 p. m.

Commander Franco had four companions when he started from Palos—Capt. Ruiz de Alda, relief pilot; Ensign Duran, observer, Alfonso, photographer, and Pablo Rade, mechanician. Alfonso was left behind at Las Palmas, when the hop to the Cape Verde Islands was made, and Ensign Duran was sent ahead from Porto Praya when the longest flight, that to Fernando do Noronha, was made, in order to permit the machine to carry its maximum supply of fuel. Ensign Duran, the observer, was picked up at Pernambuco and continued the flight with Commander Franco, Captain de Alda and Rade, the mechanic.

A fresh start, in completion of their long flight, was made on Feb. 10, when the Ne Plus Ultra left Montevideo at 11:57 a. m., Uruguayan daylight saving time, and arrived at Buenos Aires at 12:17 p. m., standard time, thus completing the flight in 1 hr. 20 min. The arrival at Buenos Aires officially ends the planned flight from Spain to the Argentine, a distance of 6230 miles.

Extreme Regularity

The flight of Commander Franco and his companions has been one of the big achievements of aviation. It is remarkable, not only for the great distance covered, but for the regularity with which the fliers stuck to their schedule, completing one difficult phase of their journey after another without hitch.

The fliers left Palos on Jan. 22, arriving at Las Palmas, Canary Islands, the same day. Thence they flew to Porto Praya, in the Cape Verde Islands, a distance of 1056 miles, on Jan. 26.

After a short rest and due preparations, they accomplished, on Jan. 30, the longest and most difficult of their hops, across the wide expanse of the South Atlantic to the Island of Fernando do Noronha, off the Brazilian coast, a distance of 1432 miles.

During the short flight from Noronha to Pernambuco, the rear propeller which had, without the knowledge of Commander Franco, become damaged during the heavy seas which the seaplane rode out on the night of the arrival at Noronha,

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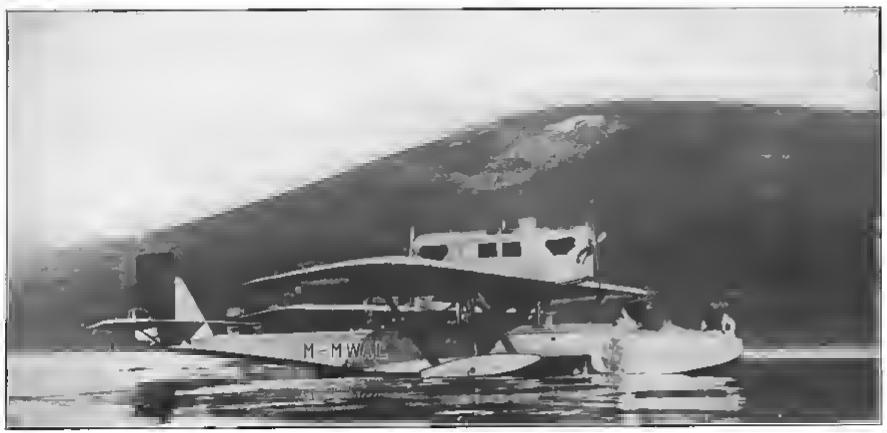


The Dornier Wal, Ne Plus Ultra, in which Commander Franco flew from Spain to South America

Marine Principles in Aircraft Propulsion

Considerations of Marine Propeller Designs Have Important Bearing Upon Aircraft Problems.

By CHARLES McH. POND

In a recent issue of AVIATION *(Jan. 11), Mr. Pond, in discussing certain questions in relation to the size of terminal landing fields for air transportation operations, placed particular emphasis upon the part that propeller performance plays in fixing the relation between the rate at which vessels gain headway and their general economy in fuel. In the following article, the writer enters into this question more fully and points out the application of this fundamental principle of ship propulsion to air transportation economics.*—EDITOR

It is a well recognized fact that, in the actual delivery of power, air propellers are far more efficient than marine propellers, notwithstanding the constant improvements that have been made in marine propellers since Ericsson's time. Moreover, it is an inherent characteristic of air propellers, like marine propellers, to deliver their maximum thrust within a limited range in speed of advance. Furthermore, an inherent characteristic of propellers is that high thrust at top speed of advance is gained at the expense of loss of thrust at low speed of advance, and vice versa.

Considerations in Marine Propeller Design

The wide range of application of marine propellers to meet definite requirements in ship propulsion is worthy of note in view of the comparatively small speed range in commercial marine use, this range being from the lowest speed to about 25 knots. As an example, the propeller of a sea going tug is designed to give its maximum thrust from zero speed up to about seven knots. This is the top speed of the boat with the heaviest tow for which the tug is designed to handle. Above seven knots, the propeller efficiency falls off very rapidly, so rapidly, in fact, that the speed of the tug will increase only three or four knots when the tow is cast off.

The case of the ocean liner, on the other hand, is that of a service which requires a propeller to meet a very different set of conditions. Here, the propeller must deliver its maximum thrust at the top speeds of advance, instead of at the lower speeds—when getting under way. As the ship gathers headway, the thrust builds up at an ever increasing rate as the top speed is approached. A vessel of this class gathers headway slowly by reason of the low propeller efficiency below about five knots.

Between these two types of vessel, marine propellers have been designed to meet various definite requirements, all of which are within the commercial speed range of 25 knots. In regard to quick pick-up in head-way, the passenger ferry boat for connecting with train service is a striking example. The operating conditions in this case are diametrically opposite to those of the ocean liner in passenger or freight service.

In the case of the liner, for any set speed, fuel economy is the first consideration. Every engine-turn-per-knot saved is gained at the expense of pick-up in getting under way. On the other hand, in the case of the ferry, quick get-away from the ship and quick stopping qualities when entering the slip, are the first considerations. About 14 knots is the top speed of such vessels. They are usually operated at a service speed of 12 knots or so, regardless of the fuel consumption. Of course, their service speed and fuel economy could be improved by changing the propeller, but the advantages gained would be offset by the time lost in stopping and starting at the slip.

If the marine propeller, with its comparatively low efficiency, permits of meeting so many definite requirements within a speed range of only 25 knots, the question is raised—what are the possibilities of the air propeller, and the airplane as an economical carrier, from the marine engineer's point of view?

Conditions for Economical Operation

In a previous article by the writer, under the title, "The Location of Terminal Landing Fields", published in AVIATION of Jan. 11, it was shown that an actual gain in time and economy may be a possibility by operating airplanes from terminal landing fields of ample dimensions, even though 20 miles or so from the commercial center that each serves.

With this fact in view, the marine engineer will ask—why not make long transportation airplanes independent of the ground between fueling ports by operating with multi-engine propulsion and eliminate the necessity for high initial thrust, required to take off from restricted intermediate landing fields, by specially designed propellers? Why not pool all interests with a view to providing air ports where land values are reasonable, in order to provide starting run-ways of sufficient length to allow for the inherent propeller deficiency at the lower speeds of advance? Then you can raise your landing speed, which will permit giving your propeller higher efficiency at the top speed of advance where it is required, in order to realize the lowest number of propeller turns per mile.

Marine and Air Requirements

Although the basic principles of ship propulsion for each definite class of service are well defined, we do not seem to be getting toward their application to the development of the airplane as a commercial carrier. We cannot hope to make any substantial progress until those, who should be interested in the airplane as a swift carrier, realize its possibilities and understand its performance or rather the reasons for any *apparent deficiencies* in economical performance—the only performance required in commerce.

Finally, if the airplane is considered as a "plane" in its true sense, riding on the air at high speed with the lowest possible resistance and consider propeller performance in terms of turns per mile, with the necessity for high initial thrust eliminated, a true conception of economical transportation by air and its intimate relation to the location of terminal landing fields, will be gained.

Aircraft Exports

The Department of Commerce announces the following statistics of domestic exports in aircraft and aircraft engines from the United States during the month of November, 1925:

Countries	*Internal combustion engines for aircraft* Number	Dollars	*Airplanes, seaplanes and other aircraft* Number	Dollars	*Parts of aircraft except engines and tires* Pounds	Dollars
Germany	2	2 358	—	—	—	—
United Kingdom	—	—	—	—	220	200
Canada	—	—	—	—	802	269
Cuba	—	—	—	—	35	124
Argentina	—	—	6	73 600	—	—
Brazil	—	—	1	25 000	267	200
Colombia	—	—	—	—	60	215
Mexico	—	—	—	—	250	203
Totals	2	2,358	6	98 600	1 324	1,361

The Spain to Argentina Flight

Continued from page 252

collapsed and it was necessary to fly extremely carefully on one engine until Pernambuco was reached. The Dornier plane, it will be remembered, is a twin engine type with the power plants and propellers in tandem. This was the only untoward incident during the entire flight.

From Pernambuco the route led down the coast to Rio de Janeiro, a distance of 1264 miles. From there the fliers flew to Montevideo and finished their journey with a short hop to Buenos Aires. There is every possibility that the return flight to Spain will be made via Central America and New York, and thence across the North Atlantic ocean to the Azores and from there on to Spain.

Bending Moments Obtained Graphically

A Graphical Method of Determining the Allowable Stress in Uniform Section Members

By MICHAEL WATTER

THE condition of combined axial and transverse loading, so often met in an airplane design, has attracted the attention of many and has been solved by several investigators in different countries. Arthur Berry of England, the late Professor Joukowski of Moscow, Professor Muller Breslau of Germany, and Professor Albenga of Italy, all gave a generalized Clapeyron's three moment equation and a general expression for bending moment of an axially loaded strut with uniformly distributed transverse load. The importance of the influence of the axial load is known to engineers and due account of it is taken in design of beams.

Case of Combined Loading

The precise method is fully described in the Air Service Information Circular, No. 493, Section I and II and in Pippard and Pritchard's book—"Aeroplane Structures." In applying this method, after the corrected moments at the supports have been found, the maximum moment is obtained, in order to determine the most highly stressed section. In the case of a member under combined loading, the magnitudes of only the maximum bending moment and the axial load are not sufficient to obtain the allowable stress, because the stress at the maximum load (which is not the maximum stress) is dependent, not only upon the ratio of bending and compressive stresses, but also upon the stiffness of the member,—therefore, upon the slenderness ratio. In the case of a wing beam, the corresponding length is equal to the distance between the points of inflection. For a detailed discussion of stresses in wood members subjected to combined axial and transverse load, the reader is referred to the N A C A Technical Report No. 188.

Bending Moment Diagram

It is clear that, in order to make use of the precise method, at least three points should be known, namely, the location and magnitude of the maximum moment in the bay and the points of inflection. The analytical work required, while not very complex, will, nevertheless, be found rather long and, therefore, the writer thought of devising a graphical method. There are several graphical methods in existance, but they are indirect and the following method is offered as giving a more accurate and easy way to obtain the correct bending moment diagram for the entire bay, the moments at the supports having been found by the general three moment equation.

The expression of the bending moment of any point in the bay is (the same notations and method are used as in Pippard and Pritchard's book "Aeroplane Structures").

$$M = A\sin\mu x + B\cos\mu x + \frac{W}{\mu^2} \qquad . \qquad (1)$$

$$\text{where } A = \frac{M_A - M_B}{2\sin\alpha}$$

$$\text{and } B = \left[\frac{M_A + M_B}{2} - \frac{W}{\mu^2}\right]\frac{1}{\cos\alpha}$$

After having computed the values of A and B, draw, to any convenient scale, the bay under consideration. On the prolongation of the axis, describe a circle with a radius equal to B, to as large a scale as possible. Describe a second circle, with a radius equal to A and distant $\frac{W}{\mu^2}$, vertically below the center of the circle B. Divide the entire length of the bay in $2n$ parts and draw vertical lines through every point. Lay out on the circles A and B segments equal to 2α, in degrees and minutes, so that, on the circle B, the middle of this segment would be on the vertical diameter at its lowest point, while the segment on the circle A would be in 90 deg. phase with it.

Divide these segments into $2n$ equal parts and number all these points (the order of numbering points of the segment A can be readily understood by examining the expression $M = A\sin\mu x + B\cos\mu x + \frac{W}{\mu^2}$ and the magnitude of the moments M_A and M_B). Through points 1, 2, 3, ... $2n$ of the segments draw lines parallel to the axis of the beam, and their intersection with corresponding vertical lines will determine points 1′, 2′, 3′, ... $2n'$ and 1″, 2″, 3″ ... $2n''$. It will be proved that the distances 1′ 1″, 2′ 2″, etc. give the bending moment at the corresponding points in the scale of A and B. By joining the points by a continuous line, we obtain the bending moment diagram for the entire bay. In Fig. 1, the bay AB, for which the diagram is constructed, the segments are subdivided into 8 equal parts. The lengths are scaled directly from the diagram. In applying this method it is necessary to express α as $57.3° \frac{l}{2}\sqrt{\frac{P}{EI}}$.

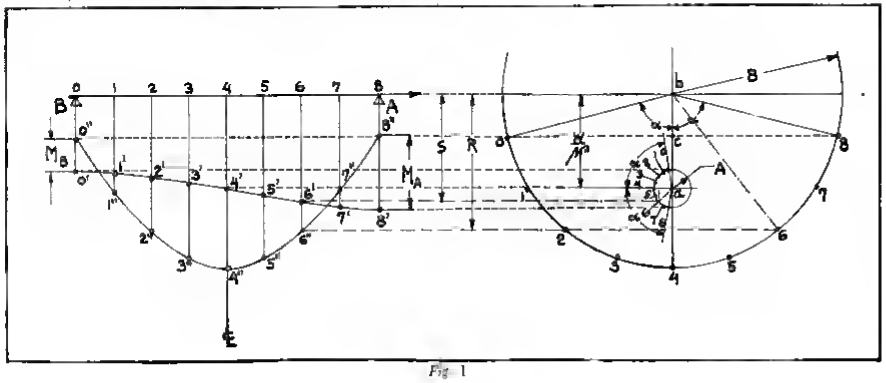


Fig. 1

Proof

The expression of the maximum bending moment in the bay can be written as follows:

$$M_{max} = \frac{W}{\mu^2} - \frac{\frac{W_2}{2} - \frac{M_A + M_B}{2}}{\cos\alpha\cos\mu x} = \frac{W}{\mu^2} - \frac{(-B)}{\cos\mu x} = \frac{W}{\mu^2} + \frac{B}{\cos\mu x}$$

It is beyond the scope of this note, but it can be proved, that, for all cases likely to be met in practice, B is negative and, therefore, the proof of the method is given for this case. When B is positive, the semicircle B is drawn above the axis of the beam.

Examining any point, for instance 6, we see that the distance 6′ 6″ is equal to $R - S$, where

$$S = \frac{W}{2} + A\sin\mu x \quad \text{and}$$

$$R = -B\cos\mu x \quad \text{therefore}$$

$$R - S = -\frac{W}{\mu^2} - A\sin\mu x - B\cos\mu x = -M_x$$

which is the same as expression (1).

Moments below the sinusoid 0′ 1′ 2′ ... 8′ are negative and those above are positive.

Location of the Maximum Bending Moment

From the expression (1) it can be shown that M_{max} occurs at a point for which

$$\tan\mu x = \frac{A}{B}$$

When A is positive and $\tan\mu x$ is negative, which indicates that the maximum moment is to the left of the middle of the bay. Should A be negative, the maximum bending would be located to the right of this point. To locate this point on the diagram, draw a tangent to the circle B at the point corresponding to the middle point of the bay; lay off on it the segment A and join its end with the center of B. The angle between this radius and the vertical diameter is μx_{max}. Project the point of intersection of this line with the circle B, on the curve 0″ 1″ 2″ ... $2n''$, to the right or to the left of the center line, as indicated by the sign of A. The corresponding ordinate of the bending moment diagram gives M_{max}.

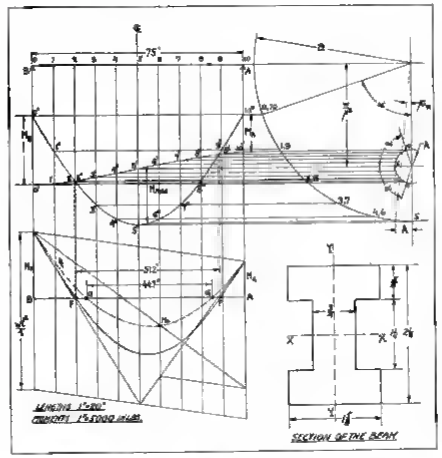


Fig. 2

Example

In order to illustrate the application of the method described above, an example is given here, in all its working details.

Assuming that we know the moments at the supports, intensity of the running load, axial compression, length of the bay and section of the beam, we can proceed to obtain the actual bending moment diagram.

Data:

Moment at the right support,	M_B = 3200 lb
Moment at the left support,	M_A = 8000 lb.
Intensity of running load	W = 10 lb /in
Axial compression	P = 2850 lb.
Length of the bay	l = 75 in.
Material	Spruce
Modulus of elasticity	E = 1900000 lb /sq. in

The beam is assumed to be routed throughout and its equivalent section is given on Fig. 2. The bending occurs in plane Y—Y.

The moment of inertia of the beam section, about the axis X—X is:

$$I = \frac{2.5' \times 1.625 - 1.25' \times .875}{12} = 1.973 \text{ in}^4$$

Next we calculate the values of α, $\frac{W}{\mu^2}$, A and B:

$$\mu = \sqrt{\frac{P}{EI}} = \sqrt{\frac{2850}{1900000 \times 1.973}} = \sqrt{.0011} = .0333$$

$$\alpha = \mu\frac{l}{2} = .0333\,\frac{75}{2} = 1.25 \text{ rad.} = 71.625° = 71°37.5'$$

$$\sin\alpha = .9490 \qquad \cos\alpha = .3152$$

$$A = \frac{M_A - M_B}{2\sin\alpha} = -\frac{1400}{.9490} = -1478$$

$$\frac{W}{\mu^2} = \frac{10}{.0011} = 9009$$

$$B = \left(\frac{M_A + M_B}{2} - \frac{W}{\mu^2}\right)\frac{1}{\cos\alpha} = (4600 - 9009)\frac{1}{.3152} = -13990$$

Fig. 2 gives the graphical construction, as it is done in practice. Instead of drawing the entire circle B, only one quarter of it is given, since the points 0, 1, 2, 3, 4 and 10, 9, 8, 7, 6 are symmetrical with reference to the vertical diameter. Observing that A is negative, we known that M_{max} must occur to the right of the middle point of the bay. This, and the fact that M_B is smaller than M_A, indicates that the sinusoid 0′, 1′, 2′ ... 10′ must mount from point 0 to point 10, i. e. the numbering of points on the circle A must be started from the lowest point. The scale of moments, which is the scale of A and B, and the scale of lengths, are given on Fig. 2.

In order to obtain the location of M_{max}, the segment A is drawn on the line 5—5″. Connecting its end with the center of the circle B, we obtain the angle μx_m, corresponding to the maximum bending moment. The point of intersection of this connecting line with the circle B is projected on the curve 0″, 1″ ... 10″, thus locating the section of the maximum bending moment.

To show the importance of obtaining, accurately, the distance between the points of inflection, the bending moment diagram as obtained by the precise method is compared to an ordinary bending moment diagram, which does not take account of the influence of the axial load. This is done in the lower left hand corner of Fig. 2, where the full line indicates the actual bending moment, as obtained above, and the intermittant line, the uncorrected bending moment.

It will be seen that the error in the magnitude of the bending moment would amount, in this particular case, to about 100 per cent, while the difference in the distances separating the points of inflection would be about 15 per cent. Moments at the supports are taken in both cases the same, actually they are slightly less for the case of simple bending.

This example makes it unnecessary to emphasize the im-

portance of applying the precise method in designing members under combined axial and transverse loading.

If desired, it is possible to dispense with the calculation of A and B, obtaining them by a simple graphical construction. In Fig. 1 it will be noticed that

$$ac = ab - cb =$$

$$\frac{W}{\mu^2} - (-B\cos\alpha) = \frac{W}{\mu^2} + \frac{M_a + M_b}{2} \qquad \frac{W}{\mu^2} = \frac{M_a + M_b}{2}$$

This suggests a construction, as follows: Draw the beam AB (referring to Fig. 1, in this case the beam is represented by the line 0″ 8″) and, on the vertical lines passing through the points of support, lay off, downward, the values of M_a and M_b. Join the two points thereby obtained and project the point of intersection of this line with the centerline of the beam on any arbitrary vertical line drawn on either side of the bay. On Fig. 1, this would be the line abc. Lay off on this line, vertically upward, the value of $\frac{W}{\mu^2}$. At the points a and b, draw the angles 2α, as explained previously. Extend the line 0″ 8″ until it intersects the lines $b0$ and $b8$. The segments thus obtained give the magnitude of B. By drawing two horizontal lines through the points 0′ and 8′ until they intersect the lines $a0$ and $a8$, the magnitude of A may be obtained.

*The first equation here should read $S = \frac{W}{\mu z} + A\sin\mu z$.

Reed Propeller Wins Collier Trophy

The Collier Trophy Committee of the National Aeronautic Association consisting of Orville Wright, chairman; Geo. W. Lewis, Godfrey L. Cabot, Earl N. Findley and Porter Adams, met on Feb. 5 and awarded the Collier Trophy for 1925 to Dr. S. Albert Reed of New York for the development of the Reed metal propeller.

The Reed propeller is well known in this country and throughout the world, and it is unnecessary here to describe it in any way. Not only has it played an important part in the winning of all the speed records, by American planes, during recent years, but it is, as is well known, employed by the Air Mail Service extensively and in numerous other planes throughout this country and abroad. In this connection, however, a letter, recently received from Dr. Reed, is of extreme interest and is reprinted hereunder as giving an insight into the very high qualities of the Reed propeller.—EDITOR.

My attention has been called to "Technical Notes No. 161, Bureau of Aeronautics, U. S. Navy Dept., giving a paper by Lieut. Col. Whston A. Bristow (British) read before the "Third Concours International de Navigation Aerienne," and entitled "The Design and Construction of Metal Propellers."

This paper is without date, but as the author refers to the Schneider Cup at Cowes, 1923, as the latest speed record, this indicates that it was written in 1924, which would largely explain the erroneous statement (page 4) "That duralumin propellers are suitable almost exclusively for very high speed aircraft requiring propellers with a tip speed equal to or exceeding the speed of sound."

In view of the developments since 1923 Col. Bristow would probably now withdraw or revise this statement.

It is true that, for super-speeds of blades, the Reed type duralumin propeller has the field exclusively to itself, and in the last 1925 races the efficiency is believed to have reached 89%.

Nevertheless out of over 1,000 Reed Propellers in service and on order on this date in the U.S. and abroad, more than 75% are for engines of ordinary speed of revolution, 1500 to 1800 r.p.m., the largest number being for the Liberty engine at 1750 r.p.m., which with a propeller of 10 ft. diameter gives a tip spred of 917 feet per second. In other words most of the Reed duralumin propellers have merely replaced wooden propellers on the same hub and the same engine and with the same diameter and therefore at the same tip speeds made by the previous wooden propeller, and there results usually a considerable gain in efficiency, besides the obvious advantage of greater durability.

The Reed propeller has now been used on more than 80 different combinations of engine and plane, of which the only high speed engines is the Curtiss D12 and V1400, the Napier (English) and the (French) Hispano Racing engines. All others are of speeds from 1500 to 1800 r.p.m.

The U.S. Air Mail has used Curtiss-Reed duralumin propellers almost exclusively for two years past. They fly DH4 planes with Liberty engines, and with a daily service both ways from the Atlantic to the Pacific and also a daily Night Mail both ways from New York to Chicago, one can easily estimate the enormous mileage which now stands to the credit of the Reed Propeller in this service alone.

The Air Mail record may also be cited in connection with Colonel Bristow's apprehension regarding disintegration of the Aluminum alloy after long service. It is no longer necessary to make a guess on this point as the record tells the tale.

But even theoretically there never was any reason to apprahend trouble from this cause inasmuch as calculation will easily show that at no section of the blade is the stress in service more than about 25% of the elastic limit, and a still smaller percentage of the tensile strength, and the best opinion is that, even with much vibration, fatigue does not occur until the stresses are much higher than 25% of the limits.

Sylvanus Albert Reed

This is substantiated by recent test of Curtiss-Reed blades by U. S. Army Air Service in which shot perforations reduced the cross section to less than 30% before the blades broke.

Colonel Bristow has also a misapprehension of the theory of the Reed Propeller. (Page 5). "This blade finds its own position of equilibrium at each speed, etc."

Of course, as a matter of fact all propeller blades do this, but Colonel Bristow evidently regards this as an application of the old theory of a self adjusting flexible propeller, in which flexibility is considered a virtue and is aimed at as a purpose. The object aimed at in the Reed invention was nothing like the above. His object was thin knife-like sections in those parts of the blades moving at speeds above 600 ft. per second. This could not be obtained without flexibility, but flexibility was an obstacle, not an object, because flexibility means inconstancy of pitch angles, and constancy of angles was essential. The problem laboriously worked out and successfully solved was a blade design which would give the thin sections without inconstancy of angles, that is to say, a very thin blade which would not flutter.

The Advent of the Radial Air-Cooled Engine

Great Possibilities for Air Cooling. Type Supplements Rather Than Competes With Water-Cooled Engine.

By W. LAURENCE LEPAGE

IN SPITE of the fact that the first stationary air-cooled aircraft engine was in use many years ago, even some time before the war, it is really only comparatively recently that this type of engine has gained any real field of usefulness. That an engine for use in an airplane should be anything else but of the air-cooled type would seem to be inconsistent since the very basic conditions of flight lend themselves naturally to the requirements of air-cooling. The history of the air-cooled engine has, however, been somewhat discontinuous in the past.

The Age of the Rotary

In 1914 and before, there were several examples of comparatively low powered air-cooled stationary engines in use but these were rapidly followed by the air-cooled rotary type which had, at that time, the added advantages of a lower weight per horsepower ratio than the static type. Despite the fact that the rotary engine was extremely extravagant in both fuel and lubricating oil, it remained in extensive use during the war until 1917 when water cooled "straight-line" and "V" types of the required horsepower became available in reliable forms and the rotary, which, apart from other disadvantages, was an extremely difficult type of engine to reconcile to the advancing ideas of streamlining in airplanes, was decreasingly used by designers.

However, the demand for an engine of the same character istics as the rotary air cooled type remained, and development work toward the end of the war became concentrated upon the production of a static air-cooled radial engine of medium power. During 1918 several air-cooled designs of powers ranging around 300 hp. were produced. While these designs, for the most part, showed promising weight per horsepower ratios, they developed numerous inherent defects which kept the type in the background for a considerable time. With the perfection of the type, however, the air-cooled radial is coming into ever increasing use.

While, of course, the air cooled type is by no means adaptable to all types of service, it has certain inherent advantages which give it a very wide range of possibilities. There have been a number of ambitious statements made from time to time of the great reduction in weight per horsepower ratio possible in the radial air-cooled design over that of a water-cooled engine of similar power. While there is a certain degree of truth in such statements, this fact is not true without qualification. It can be said with a fair degree of certainty that, in general, an air-cooled radial static engine of 200-300 hp., complete with all equipment, is probably lighter per horsepower than a similarly powered water-cooled engine fully equipped. But such a statement, while being reasonable in general cases is not the case in specialized examples. For instance, in the higher powers it would be difficult to find any air-cooled engine which had a lighter weight per horsepower than the Curtiss V-1400 water-cooled engine which was used in the record breaking Curtiss racers during the 1925 air races and the 1925 Schneider Cup race.

A Matter of Weight per Horsepower

In considering the technical advantages of the static radial air-cooled engine, however, weight saving must figure with some importance, since, in the case of the Curtiss engine, for instance, this is a somewhat exceptional case, and, in general, a reduction in weight per horsepower of the order of 15% is a reasonable assumption for the air-cooled type over the water cooled type of similar power and fully equipped with cooling system. The importance of weight saving in the design of airplanes, especially in military designs, is paramount and this fact alone will spell a wide future for the air-cooled type of power plant.

Another most important consideration is the dispensing with the radiator system necessary in the water cooled type. The advantages of this, alone, are tremendous, although, again, the extended use of the water-cooled engine with its radiator has been attended with unsurpassed success. Nevertheless, the complete absence of the radiator with its attendant difficulties will long remain an important feature of the air-cooled type of engine. Most important in this respect must be cited the case of the pursuit type of airplane. The most recent ideas of streamlining lend themselves in very small measure to the installation of the normal type of water radiator. It was this very fact that encouraged the development of the wing radiator, which has played such an important part in the development of racing planes which have brought to America and maintained in this country the speed records of the world. The immediate outcome of these racing plane designs has been the standard pursuit plane of the Army Air Service today. But it is a significant fact that in these planes, the wing type of radiator has been abolished in favor of one of a more usual design. This change was rendered necessary, owing, not only to trouble which was encountered with the delicate wing radiator under service conditions, but also to the excessive vulnerability of the wing radiator which offered such a wide area as a target for enemy guns.

Air-Cooled Pursuit Types

Yet, in spite of the excellent performances set up by the pursuit planes of the Air Service, the type of radiator now standard on this plane cannot be said to improve the otherwise fine streamlining which has been incorporated in the design of these planes. So, it is that, in the field of the pursuit, there would seem to be very good reason to expect the radial air-cooled engine to play an important part in the near future. Already there are signs of the advent of the air-cooled pursuit plane, as a close competition of the now existing type. The complete test figures of the first American air-cooled pursuit plane are not yet available but there is every reason to expect the design to turn out a close competitor of former types. Furthermore, it must not be forgotten that the British have almost standardized on the air-cooled engine for pursuit types of airplanes and some very commendable performances are being obtained.

For Tropical Flying

There is a further point related to cooling problems in the two types of engine. There is, at the moment, very little data available on the serviceability of the air cooled engine in extreme temperatures. There is every reason for believing, however, that the type will possess many advantages over the water-cooled type. In the first place, there is always the important point in connection with aircooling, which, it would seem, will render this type of engine at a tremendous advantage over water cooled engines in hot climates. Since the air-cooled engine derives its cooling directly from the metallic fin surface of the cylinders themselves and it is a generally accepted fact that an engine will maintain approximately full power at a temperature of 150 deg., there would seem to be no likelihood of a complication arising from overheating of air-cooled types in hot climates. On the other hand, in the case of the water-cooled engine, a temperature of from 80 to 90 deg. will mean excessive evaporation of the water in the radiator and the losses entailed may become considerable.

From the installation point of view, there is a wide field for discussion on the relative advantages of various types of engines. The extremely short overall length of the radial type lends itself very admirably to the design of airplanes in which the pilot's view is of primary importance. Furthermore, the type lends itself to maintenance and even complete overhaul within the very minimum space of time. This is an extremely important point in favor of the air cooled en-

gina of the radial type. These features, and many of those already discussed, apply only to the radial type of engine, since there are a few "straight-line" and "V" type air-cooled engines in limited use, which would not necessarily possess all these advantages, being, especially from the point of view of accessibility, almost identical with the usual form of water-cooled engine, with the one exception that, in all air-cooled engines, the complete absence of the water radiator system must always spell simplicity, both in installation and maintenance.

Low Maintenance Costs

There would seem to be every reason for experience in the air-cooled engine of the radial type to demonstrate that, from the point of view of general maintenance, there are distinct advantages which render radial engines more adaptable to commercial uses than other types may be. Since, in commercial air line operation, maintenance and operating costs are so important, any feature which makes for minimizing these factors will be of the very first importance. There is reason to believe that the radial air-cooled engine will, under routine operating conditions, minimize the overhaul time chargeable to any one airplane, owing to the fact that complete overhauls may be carried out very much more quickly than is possible in other types, since the radial is so accessible. This is a very important point, since, the time that any one airplane employed on an air route is grounded has a marked effect upon the operating costs of the line. Adjustments may be made very conveniently in radial engines since all the accessories of the engine are, in general, easily got at without the need for any dismounting.

A discussion of aircraft engines and the possibilities of reduced cost from the point of view of commercial operations, where costs are of greater import than in other fields, immediately reverts to the feasibility of a reduction in the initial construction costs in manufacture. It is difficult to indicate just what the future may have in store in this connection, for engines for commercial uses have not, so far, been manufactured on a large enough basis to show the future possibilities of reduced costs under mass production. However, the fact that, in the radial type of engine, all parts radiate from and are symmetrical with a definite center, would suggest many possibilities from the mass production point of view. Many parts are, themselves, circular and can, therefore, be turned out mechanically, which is not otherwise, always possible.

But, from the structural point of view there are numerous questions which can only be answered after considerable experience has been gained with radial air cooled engines over a fair space of time. It would seem probable that, in the case of a radial engine in which all the cylinders are in a single row and have pistons operating on the same crankshaft, considerable advantage might accrue from the simplicity of the crankshaft which can be used. For example, inertia torque, which is considerable in a "straight-line" or "V" type engine, can be reduced to a minimum and, in fact, be almost eliminated in the radial type of engine. This point must have an important bearing upon the design of the crankshaft, since, in the straight-line and "V" type engine, the rapidly alternating accelerations and decelerations of the pistons, which apply their reactions at varying accentive points along the crankshaft must set up severe stresses in this member. In the radial type this does not exist, since the connecting rods from all the cylinders come to the same common crank pin and the aggregate of forces applied are balanced radially by the numerous connecting rods. Not only does this feature tend to reduce the stresses applied to the crankshaft but the vibration in the engine is greatly reduced and the minimized inertia torque makes it possible to employ a reduction gearing with more reliability.

Cooling Problems

One of the most noticeable failings of the radial type of air-cooled engine, in the past, has been the trouble experienced in obtaining even cooling throughout. This has been largely caused by the disposition of the numerous accessories and parts of the engine which have to be placed in the most advantageous positions. This possible deficiency in radial engines has been somewhat exaggerated by the fact that designers employing this type of engine have frequently been guilty of providing a cowling which has the effect of further shielding the engine cylinders. However, this inherent problem is being overcome in modern air-cooled engines and designers, too, are giving more careful attention to installation problems. There is, in fact, one radial air-cooled engine of high power which has only just made its appearance, in the design of which, special consideration has been given to the problem of totally eliminating the necessity of a cowling. The engine accessories are all located at the rear of the engine and great care has been given to maintaining the front as clean and free from obstructions as possible.

The up-to-date air cooled radial engine must be considered as a modern development which fills a definite need in a sphere of its own. It does not represent, in every sense, a compellor of the water-cooled type but rather a class of engine which relieves the water-cooled engine of that duty which it is not most advantageously fitted to handle. There are numerous problems which are likely to be met in the design of really high powered radial engines and this sphere will, it would seem, for some considerable time, at least, be fulfilled by the "straight-line" and "V" types of water-cooled engines. While it is true that the fuel and lubricant consumption is higher in the air-cooled engine than in its water-cooled prototype of similar power, this factor is nothing like as pronounced as during the earlier stages of the development of the former and the commercial possibilities of this type of engine are pronounced. The air-cooled engine in small units, particularly in multi-engine airplanes, would seem to have a tremendous future.

THE FIRST AMERICAN AIR TRANSPORT

Here is the first of a fleet of ten Curtiss Carrier Pigeons to be operated soon by National Air Transport, Inc., on the 1000 mile mail and express route from Dallas—Fort Worth to Chicago by way of Oklahoma City, Wichita, Kansas City, St. Joseph and Moline. The Carrier Pigeon carries 1000 lb. of pay cargo for 5 hr. at 100 m.p.h. The National Air Transport, of which Col. Paul Henderson, former Second Assistant Postmaster General, is General Manager, will operate at a later date between Chicago and New York.

Facts on French Aircraft Industry

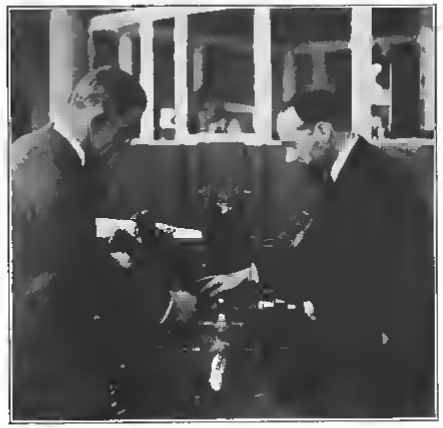
The total number of manufacturers of aircraft in France, both large and small, is placed at 40 according to a report to the Department of Commerce from Assistant Trade Commissioner H. H. Kelly, Paris. The number of manufacturers of aircraft engines is given as 21.

The total number of planes built in 1924 was estimated at 3,000, and it is believed that 1925 marked an increase over this figure. About 25 new types of planes were developed during 1924. One company at least has begun to use the "assembly line" system of production and this company has an output of three planes per working day.

Furthermore, on Dec. 1, 1925, the following ports and fields were in operation: 1 principal port (at Le Bourget, near Paris), 2 secondary ports, 12 frontier stations, 9 regular stations, 22 emergency fields, 20 military fields, where civilian planes may land, 4 common fields, 7 bases for seaplanes and 2 ports-of-call for seaplanes.

Foreign Agents Available

Agents in Greece have advised the Department of Commerce that they would like to represent American aeronautical manufacturers exporting airplanes and parts, as well as hangars, portable and permanent, and engines. They would also handle aeronautical electrical equipment, and wing covering fabric. Inquiries regarding this matter, filed with the Washington or New York headquarters of the Department of Commerce, should refer to trade opportunity No. 18821.



J. T. Hartson of the Wright Aeronautical Corp. and Capt. C. H. Wilkins (right) inspecting one of the Wright Whirlwind engines which are to be used on the Detroit Arctic Expedition. Captain Wilkins is in command of the expedition.

Scale-Effect Research

Extensive scale-effect research has been carried out in the variable density wind tunnel of the National Advisory Committee for Aeronautics, at the request of the Army Air Service and is described in a recent N.A.C.A. Report. A 1/10 scale model of the Sperry Messenger airplane, with U.S.A.5 wings was tested without a propeller at various Reynolds numbers up to the full scale value. Two series of tests were made. The first, on the original model, which was of the usual simplified construction, and the second on a modified model, embodying a great amount of detail.

While the report on this work is of a preliminary nature, the work has progressed far enough to show that the scale effect is almost entirely confined to the drag. In the tests so far conducted, the drag at any given angle of attack within the normal flying range, is found to vary as $(\frac{V}{v_0})^n$. The exponent "n" is constant for any one angle of attack, and ranges from —0.045, at large angles of attack, to —0.17 at small angles.

It was also found that the model should be geometrically similar to the full-scale airplane if the test data are to be directly applicable to full scale. If the condition of geometric similarity be fulfilled, the data obtained at a full-scale value of Reynolds number agree very closely with free-flight data. The variable density wind tunnel, therefore, appears to be a very promising instrument for procuring test data free from scale effect. It is also admirably suited for studying the scale effect and obtaining information which is necessary in an interpretation of the results obtained in atmospheric wind tunnels at low values of the Reynolds number.

A copy of Report No. 225, entitled, The Air Forces on a Model of The Sperry Messenger Airplane Without Propeller may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C. The report is by Max M. Munk and Walter S. Diehl.

Aviation Question Box Via Radio

WHB, the Radio Station of the Sweeney Automotive and Aviation School of Kansas City, Missouri, is broadcasting talks on Aviation each Thursday, at 7:30 p.m. These talks are by the School's Chief Aviation Instructor, Mr. Harry Wimer, who is well known in aeronautical circles in the Middle West.

After his regular talk of the evening on some subject pertaining to Aviation, Mr. Wimer is conducting an Aviation Question Box. Listeners on the programs are sending in aviation questions in which they are interested and which they wish answered. The answers are given via radio. Considerable interest is shown among radio fans who are also interested in aviation. Many questions are being received which are being taken care of as far as broadcasting time permits.

What Pilots Think About Air Legislation

Emphatic Opinions From All Parts of the Country

Regarding the effect of strict aircraft regulation, I would like to describe what a Canadian has to contend with, if he wishes to fly.

After completing a course of flying instruction in the United States, I was anxious to get a plane of my own when I got back into Canada. Knowing that to obtain a pilot's certificate, required the passing of rigid tests and accurate flying, I asked if I must provide my own machine for tests and was informed that I must, which meant that I would have to pay $2500.00 for a machine plus $125.00 freight and take a chance of being allowed to fly it. I would also be required to register the plane and paint large letters on the top and bottom of wings and stabilizers, and both sides of the rudder and fuselage, in black and white, and when finished the plane would resemble a billboard.

A private pilot can carry all the passengers he wishes, but must not accept payment. To fly for any remuneration, I must employ an air engineer to inspect the machine and have a licensed airport.

The department that controls civil aviation, takes great credit upon itself for having reduced the number of flying fatalities. I believe, if the truth were known, it has reduced the total flying time, in like proportion. I have met a great many Gypsy fliers and invariably find them to be the type of men that not only can fly a plane, but can assemble a plane or engine or can built up a wing section. These are the real commercial fliers. They make the plane pay its way, and are building up a business on the solid foundation of experience. As much credit is due these men for steady advancement of aviation, which the United States has enjoyed, as is due to the Army and Navy.

These men have kept aviation before the eyes of the public from California to Northern Maine, and the young and old are interested. The child wants a toy airplane, the youth wants to learn to fly. The result is that many fine flying schools have been established throughout the country, and the flow of young pilots from these schools has increased the demand for planes, motors and parts. The using-up of the Standard Jennies, etc. has created a desire for something better, hence the market for such splendid ships as the Waco, Laird, Travel Air, Swallow, etc.

Why not put restrictions on the automobile, and compel the public to abandon their cars and use the big bus lines? It would be impossible to put such a law into effect to-day, yet it would have been comparatively easy twenty years ago, when parents warned their children not to go near an automobile, as it was liable to explode at any time.

The aircraft industry is about where the automobile industry was twenty to twenty-five years ago. I hate to think what business conditions would have been to-day, had such regulation been put on automobile operation twenty years ago as is in effect on aircraft operation in Canada, at present.

Deaths due to careless automobile operation are appalling, yet an automobile accident is soon forgotten, but if the so-called Gypsy flier or his passenger is killed it will adorn more space in a paper, than did the loss of the Shenandoah.

J. C. Folkins,
Woodstock, N. B.

The aviation industry in this country at the present time is too lightly supported in a wavering position to be able to overcome the effects of any kind of legislation. We are proud of the fact that we stand high with real service in this particular line, unsubsidized by the government, but if any legislation is introduced at this time, it will undoubtedly have the influence of forcing our really commercial flying back to where it was five, or even ten years ago, leaving only a few of the larger of our commercial flying organizations to keep the service faintly alive.

An legislation would undoubtedly destroy a great deal of the incentive for young men to learn to fly and would consequently retard the progress of flying as well as to require a much longer time to educate the public to air-minded thinking. It would cut down the market for airplanes and for all kinds of airplane supplies, which in turn would greatly reduce the amount of advertising along these lines and unquestionably have a very serious effect on aeronautical publications.

The danger in flying has been greatly exaggerated by the faithful publication of all accidents and crashes, and a general negligence of the great amount of safe service that has been given, even under some very adverse conditions.

My idea, therefore, is that the time for air legislation has not yet arrived, and the industry should be allowed to progress unmolested for a few more years and by that time a clearer idea may be evolved as to what kind of legislation will be of the greatest benefit, the government, in the meantime, could greatly assist aviation to a more stable position by turning its efforts to marking airways, establishing well marked landing fields and giving to aviation a first-class meteorological service. As to state legislation, I think that would introduce such a mess that even disallows the consideration of the thought.

Harry L. Bitterman,
Reading, Penna.

I have been flying a few years and have a Canuck and a field where I carry passengers, etc. When I "went loose" I had considerable instruction and "joy hop" time. Hence I was fairly capable. I carried passengers before I had five hours solo. At that time I was cautioned of dire results by an "Old Timer" whom I had personally seen carry passengers before he had 10 hours solo. He also cautioned me that I was not capable of carrying passengers until I had 200 hours. This same pilot had less than 200 hours himself at the time and was flying for our biggest flying company here. However I continued to carry passengers for the rest of that year without any trouble. Six months later while "joy hopping" I miscalculated speed and distance and with the help of a strong gust of wind broke the landing gear on a Jenny.

I have seen a student take instruction on a plane that several pilots declared unsafe in rough weather due to very limited aileron control. He found a pilot who gave him instruction on it and immediately after his solo flight he dismantled his plane, took it to points south, where he is now carrying passengers.

I have seen a fellow with less than four hours solo, fly from Philadelphia to Roosevelt Field, without compass or map, make a good landing and later proceed to upper New York State. I have seen solo pilots manage forced landings that would do credit to veteran pilots.

I have seen an "old timer" land and roll into a plane, wrecking both. I have seen "old timers" let ship "run away" several times. Many times have I seen "old timers" wash out ships. I have seen "old timers" spin trying to get back into a field. I have seen an "old timer" crack-up getting out of a small field in fine weather. My observation has been that new pilots rarely crack-up if properly grounded in fundamentals. It is later when they become "good" that they begin to crack-up.

What's the answer to all this? I believe legislation is very harmful. All I would like to ask is this,—who shall be "regulated"? These new pilots all of whom could qualify for a license or the old timers who are "good" and who crack-up? Perhaps some of your readers have an opinion or two on the matter.

E. J. Devereaux,
Long Island, N. Y.

The last two issues of Aviation have contained especially interesting articles under the News Letter section.

The first, relating to the distinction between aerial transportation and aerial service very justly gave credit to those Gypsy fliers and barnstormers who are trying to make a living, flying their planes around the country in as safe a manner as possible.

The News Letter in the issue of December 28 refers to the Bingham Bill and the absolute necessity of some form of regulation, especially as applied to pilots. These Gypsy fliers, by their extremely varied experiences, will ultimately form the backbone of American commercial aviation.

I learned to fly in England in 1920. I was Observer, R.F.C. in the War. As I had no experience behind me to cover the requirements of the air licensing for a "B" license, (necessary for all commercial work), these requirements include such things as 200 hr. cross country flying, etc.), I had to be content with an "A" license which only allowed me to fly "not for let, hire, or reward." In other words, I could not possibly get my experience without paying for it out of my own pocket. How can the new aviator keep flying without making money by it? Also how can you let him fly (the novice) without endangering the public?

If you are going to have a system of "A" and "B" licenses, why not have the "A" preventing the pilot from "carrying passengers for let, hire or reward"? But at least let him carry freight, do exhibition, advertising or ferrying work, and give him a chance.

In the four years I have been in America I have flown all types from Jennies to Fokkers and S.V.As and also HS-2Ls. Up to date I have not scratched a passenger.

I am holding a piece of wood in my hand.

A. H.

I have been a pilot since 1913. This gives me thirteen years of actual flying experience, with the exception of fourteen months, when I could not get a machine. I flew more than four years during the war, mostly in Palestine, Turkey, Dardenelles. I am now flying a Standard J1 OXX6 motored.

Should a pilot be licensed? Yes, absolutely, but only those who fly for hire. Pilots who carry passengers must be licensed and show their ability to fly any kind of aircraft, inspect aircraft, and repair minor defects or troubles. Such a pilot should be responsible for his plane, because he knows if his machine is airworthy. State or Federal inspection therefore, is all wrong. I am sure Federal would be better than state regulation. The important thing is to have the country full of landing fields and land marks. The government is helping the railroads and the farmer,—why not the aviators?

Max Sussin,
Chicago, Ill.

I want to compliment Aviation on its editorial comments. They nearly always hit the nail on the head. How the editor has been able to feel the pulse of the aeronautical field, country wide as it is, with such accuracy has always been a mystery.

There is just one thing I want to ask, and that is to discourage the use of the term "Gypsy flier." I hate that term; it always sounds like an aspersion and it is.

There are very few fliers deserving the name "Gypsy." Yet its frequent and widespread use has created the impression that all civilian fliers are to be referred to by that name. What few itinerant fliers there are are merely "house hunting," and sooner or later find suitable spots and establish permanent bases. Of course, every "fixed base flier" has a rather definite territory that he considers his own and resents invasion of by others. He "covers" all the principal towns in his territory at least once a season and is usually present at such towns when any "big time" is going on. The inhabitants of these places often are aware of but two outstanding figures in aviation, General Mitchell and the local flier.

At any rate, let us try to find a better name. I once wrote an article for a local weekly in which I referred to us fliers as "Aerial Evangelists Spreading the Gospel of Aviation," but "aerial Evangelist" is not a name for every day use. If you should ask the military fliers what we should be called they would simply answer—"scum."

Now there is another problem. This country is overrun with C.A.F. and R.A.F. pilots, who never have a good word to say about American planes or their performance. Just why there are so many of them here when their own countries are so well regulated by aerial legislation, I cannot understand. Among the commonest complaints of these pilots is about our right hand throttle. Now I'll tell you how our military planes come to have left hand throttles. From the earliest times American planes had right hand throttles and nobody ever thought it was all wrong. But about 1917 or 1918 the British sent over a "mission" to show us just how to do everything in aviation according to the latest approved (British) style. What was their dismay to find all our planes with right hand throttles. Orders were at once given to somebody, and immediately all the throttles had to be changed. Flying was suspended altogether at some fields while the change was being made but where I was, teaching the angels in Paradise (Kelly Field), the change was made only on a few planes at a time, these planes being returned to the line while others were being "modernized." One never knew when arising to start the day's work, whether one was going to fly right handed or left handed. So confusing did it become, that many a plane landed itself before the pilot could decide which hand to use on the stick during that crucial moment.

Now that the British have given up their control of American aviation, the American builders of American commercial planes are returning to the right hand throttles of their ancestors.

Now we come to Regulation. Why has there been so much agitation for regulation? Some say it will induce capital to invest in aviation. Capital will come into aviation when, and only when capital sees big profits, regulation notwithstanding, and the day is coming when there will be plenty of capital and plenty of profit.

As President Coolidge has said, "Regulation puts handicaps on the many so that a few needing restraint may be curbed," or words to that effect. Now if there is any need for immediate regulation, why can't we get together and regulate ourselves?

The majority of pilots favoring regulation give as their main reason the prevention of incompetent pilots from carrying passengers. Is not that something that fliers themselves can regulate by forming a licensing association and refusing to issue a pilot's passenger carrying license to any student until said student has served a two or three year apprenticeship of some definite character?

Many people see themselves only as the standard upon which regulation will be based. They are in favor of regulation that will not disturb them, but will make everybody else conform to their particular view. Everybody must have as much flying time as they have and be able to fly almost as well as they fly, before the newcomer is considered competent, etc.

No regulation or anything else is perfect. While some may find one sort or some measure of regulation of benefit to themselves, others will find it just the contrary and furthermore, no regulation can regulate without enforcement, and that means inspectors and arrests and fines and lawyers and politics and corruption, graft and pull, incompetent and ignorant politically appointed inspectors, with "know-it-all" and despotic manners.

I call on all brother fliers to fight off regulation as long as possible and where regulation may be necessary to provide that regulation for and by ourselves.

L. M. Rous,
Parkesburg, Pa.

Caldwell's Flying Guyed

See America First With a Thirsty Pilot

By CY CALDWELL

I STARTED out to write a real flying guyed that would enable a pilot to find his way to any place in the country. From Boston to Hartford, I made notes of every house and bush on the way. I could tell a chap just how to fly the route, without a map. But, like every other plan I ever made, this one slipped, too. I can't make this a complete guyed. You boys will have to fly by map, as formerly, much as I regret it. This guyed will only be of service after you reach town. You see, I met Rand and McNally, and told them what I was going to do with this guyed. Immediately, they burst into tears. They were up in my room, here in Philadelphia, and they just swamped the place with their tears. It was some time before I could get them calmed down enough to tell me what distressed them so. They said that, if I made this guyed too good, the boys would stop buying maps, and Rand and McNally would be ruined. The upshot of it was, I promised them that I would try not to cut into their business, and they left me happy as larks.

Harvard's Great Landmarks

But, here I am talking about Philly, when I haven't left Boston yet. I took off in the coldest day in January—I only seem to fly in the worst weather—and crossed Boston Harbor, where they had the Tea Party, flew over the Charles River basin, and cut past the Harvard Stadium, the principal building of the University, and past the boat club, another great Harvard building. With the gymnasium, these make Harvard one of the greatest seats of learning in the country, if not in the world. I felt cultured, just looking at it all, until I passed over Worcester, which brought me back to normal, or even a little below normal. Worcester is like that.

It did my heart good to see the dear old State Insane Asylum at Worcester; and the tears came to my eyes as I thought of how Casey Jones and Tony Yackey and I had played there together as boys in the Aviation Department. I can picture us now, flying our little kites, and looking forward to the day when they'd let us out to enter commercial aviation. We used to be inseparable playmates, until lunch time, when Tony would take his bread and garbe and sit off by himself. Poor Tony! He's failed a lot since the old days. Why, when I was in Chicago last fall he actually gave me a complete set of new spark plugs for nothing! When I told Casey about it, the tears came to his eyes as he commented on how Tony was growing old and losing his grip. However, we comforted ourselves with the reflection that we were bearing up well, and hadn't given away anything yet.

From Worcester to Hartford, lies some of the worst flying country in the world. There is hardly a place to land, or at least, to take off again. Just hills and trees, with tiny fields in between the woods and streams. It seamed to me that a plane with three engines was needed in that country, so if one went blooey you could fly on the other two, until they went. I devoted nearly an hour thinking of the benefits of three or more engines, until, by the time I hit the Connecticut Valley, I was convinced that at least five engines are needed to crawl safely over Connecticut. Then, when I got to New York, later on, and met Ed Mulligan of the Wright Aeronautical Corp. and drank a pint of his Scotch at the Commodore, I was absolutely convinced that every plane should have at least 7 Wright Whirlwinds. I'll say this for Wrights—if their engines are only half as good as the Scotch, you'll never have a forced landing. (Advt.) I mean to say, if you drink up all a man's likker the least you can do in return is to say that the rest of his products are alright.

Hartford, I learned upon landing there, is the center of aviation for—, well, for Hartford, I guess. Harry Copland, an old R A F. man, with whom I stayed the night, said Hartford was the center of aviation, and I nodded affably. I always nod affably to anything after dinner. Harry and I spent the evening parlor-flying and boudoir-hombing, the usual flying activities of the old-timer. We had a lot of fun telling each other what bold, bad men we used to be in the old days, and managed to give his wife the impression that we had been of great service to the Cause, in off moments from our French social life. Harry was telling me of his early flying experiences in a plane he built himself. He flew 1½ min. and started to turn, when the hospital nurse said, "Sit up and drink this."

I left Hartford on another bitterly cold day. I don't know why more Eskimos don't come down here and be pilots. It seems an ideal business for an Eskimo. I believe an Eskimo could have felt comfortable on that flight to New York. Certainly, I could not. First my feet grew numb, then number—or more numb, I think I should say. Then my hands ceased functioning as hands, then my face started to freeze. I wanted to get up and walk around to keep warm. As I passed trains beneath me, I could picture the warm, cosy Pullman cars, with that useful little compartment at the end of the car. You know what a relief it is to be able to go into the smoking compartment and smoke. I never wanted to smoke more in my life than I did that trip. I thought I never would get to Garden City. And all the time I grew colder and colder. You know how it is when you want to smoke, and can't. There is certainly much to be said for train travel in the winter.

A Budding Young Modock

I got quite a shock when I got to Garden City. Casey Jones took me out to his house and gave me a drink. Two, in fact. And he never even mentioned metal props. I don't know what's got into the old boy. I hate to think he's losing his grip, but it looks dangerously like it. Well, it's a fact that, from the age of thirty on, we start to fall apart. I guess the only hope of this flying business lies with the coming generation. Casey's young son, Sherman, named after the general who so accurately defined war, was playing around, and I said I supposed this was the coming racing pilot of about 1940. But Casey said, "No, I think I'll make him into a Modock." He seemed to be a bright little chap. He had a toy train that he was playing with. That's a good sign. I used to fly kites when I was a boy. And just look at me now! I think Casey has the right idea about the boy. Anyhow, I gave little Sherman my N A A. button to wear. If I send him my old Air Races arm-band, stamped "Official", his future is assured.

Philadelphia Gets National Air Races

The National Aeronautic Association, on Feb. 1, received adequate assurances of the depositing of prize money and of the requisite further needful financial guarantees from the Sesquicentennial Exposition Association in Philadelphia.

Accordingly it announced the definite assignment of the National Air Races for 1926, to be held at or near Philadelphia in connection with the Sesquicentennial Exposition and in the month of September. The annual Convention of the N A A. will take place at Philadelphia next September.

Swedish Airplane Manufacture

The Swedish Airplane Co. has recently received important orders for military types of airplanes from several European governments. Furthermore, this factory is the only one in Sweden, making commercial planes and it is owned by Akth. Aerotransport, Stockholm, which operates subsidized services between Malmo and Amsterdam, Malmo and Copenhagen, and Stockholm and Helsingfors. All planes are along the general lines of the well-known Junkers type and are of all-metal construction.

AIR TRANSPORTATION

Developments in Italian Civil Aviation

Preliminary studies of various air lines between important Italian cities and from cities in northern Italy to Central European or Near Eastern points have almost been completed. The air routes proposed are (1) Genoa-Barcelona, (2) Turin-Pevia-Trieste, and (3) Rome-Brindisi-Athens-Constantinople.

Status of Proposed International Air Services

The 50 hr. now required to travel by rail from Genoa to Barcelona may be reduced to 7 hr. by air. On the Turin-Trieste line the flying time will be 3½ hr., and seaplanes manufactured by a Trieste company will maintain the service. For use on the Rome Constantinople service, planes with a capacity of 10 to 12 persons and a load of 2 metric tons are nearly ready, and experimental flights may begin in the near future. Landing fields in Italy and meteorological stations are completed, but the landing fields at Athens and Constantinople are not yet finished.

Experimental flights between Milan and Geneva and between Milan and Zurich are being carried on. Negotiations are in progress between the Italian and Spanish governments for the establishment of the Genoa-Barcelona air line, and an air convention between Italy and Switzerland may soon be signed.

Genoa-Rome-Naples-Palermo Air Line Organized

The Genoa Air Navigation Co., which was organized for the purpose of serving the proposed Genoa-Barcelona route mentioned above, has signed a convention with the Italian Air Ministry for the operation of an air line between Genoa, Rome, Naples, and Palermo.

Flights on the service between the Italian ports named were undertaken during December and establishment of regular service was scheduled for January with bi-weekly flights and return between Genoa and Palermo. Daily trips are planned to begin in April.

The line is reported to be using seaplanes of the Dornier Wal type, constructed by the Genoa Air Navigation Co. at its Marina di Pisa plant. The seaplanes are equipped with two Bristol Jupiter air-cooled engines of 450 hp., built in the works of the Piaggio Co. at Pontedera. These planes are capable of flying 10 hr. continuously, and can carry 15 persons as well as a substantial weight of postal matter.

London-Cologne Air Route

The importance to British air transport of maintaining the London-Cologne route in operation after the British Army of Occupation has left Cologne is considerable and there is uncertainty as to the future position.

All members of the International Commission for Aerial Navigation grant reciprocal rights to fly over each others territory, but Germany is not a member of that body, and reserves to herself the right to prohibit foreign aircraft from flying over her country. So far, British aircraft have been enabled to fly to Cologne, and cordial working relations have always been maintained with the Aero Lloyd company, in arranging for an air service between London and Berlin. When Cologne is evacuated, however, Germany may (it is not certain that she will) reconsider the position in regard to the airdrome facilities at Cologne, and, while she is hampered in her development of commercial aircraft by the Nine Rules and their restrictions on aircraft performance, she is hardly likely to become a member of the international body. Actually, it is as much in the interest of Germany as of Imperial Airways to preserve this route, for quite a useful passenger and freight traffic has been built up between Cologne and England, and, apart from that, Cologne is a natural air center from which air connections can be built up to many parts of Europe.

The Imperial Airways Indian Mail

As a result of a trip made to India last winter by Air Vice-Marshal Sir Sefton Brancker, Director of Civil Aviation in the British Air Ministry, who was piloted by Alan Cobham, and as a result of a survey of the route from Egypt to India, made last September, it was recently announced that an agreement had been reached between the Air Ministry and Imperial Airways, Limited, for the establishment of a regular air service between Egypt and India by Imperial Airways. According to the terms arrived at, Imperial Airways are to maintain a regular fortnightly service, with three-engine planes, for the transportation of mail, freight, and passengers in each direction by the way of Bagdad and Basra. The amount of the subsidy which has been arranged is dependent upon the number of flights successfully completed, but the maximum amount that can be earned on each half of the route is £93,600.

As it has been practically certain, for the last six months, that the contract would eventually be awarded to Imperial Airways Limited, this company has gone ahead with the order of several planes.

Owing to the time which will be necessary for the construction of planes and also for the preparation of suitable landing fields, this service cannot be inaugurated before the fall of 1926.

Progress of Junkers Company

The German air route companies are now publishing their reports for the past year.

The first results to appear are those of the Junkers company. From January up to the end of November, 1925, this company made 30,000 flights and carried 80,000 passengers, 370 tons of goods and 250 tons of mails over its lines. The distance flown represented approximately a total of 2,800,000 miles. The regular service was practically free from accidents, only five passengers being slightly, and one seriously, injured. The night service over the Baltic, which has been in operation for some seven months, has been maintained without interruption during the last four months.

Franco-German Controversies

The division of control over European transcontinental air traffic between France and Germany, may very possibly be the outcome of the negotiations proceeding at present in Paris on Germany's future in the air.

Germany demands freedom for her civil aircraft as her right, not as a concession, and she claims compensation for permitting France to fly over German territory. As France is planning several new lines toward the East, which include Paris-Moscow, Paris-Prague, and Paris-Constantinople, Germany demands the right to control the line, Berlin-Madrid.

Plan London-Tokio Air Line

Negotiations are in progress between the Soviet Government and the Aero-Lloyd Air Transport Company of Germany for the establishment of an airplane service between London and Tokio, by way of Russia. The proposed route is through Berlin to Moscow, thence to Irkutsk, Siberia, and Pekin, China, thence to Dairen of the Liaotung Peninsula in Northeast China, then to Seoul, Korea, and across to Tokio.

The Soviet Government has plans for the establishment of branch air lines linking the main line with such areas as the Yakutsk gold mine center in eastern Siberia. At present it takes nearly fifty days and an escort of from forty to fifty men to get a consignment of gold from Yakutsk to the railroad. By air, Soviet officials say, it can be done in one or two days and without an escort.

Art Smith

Art Smith

It is with the deepest regret that it becomes necessary to report the death of Art Smith, the well known Air Mail pilot. Art Smith was one of America's best pilots and was very widely known. He was killed when his mail plane struck a tree and crashed to the ground near Montpelier, Ohio, 6 miles Northwest of Bryan, on the night of Feb 12. His body and the mail he was carrying from Chicago to New York were burned when fire broke out when the plane hit the ground. He was about 2 miles off the regular air mail route between Chicago and Bryan. Visibility was reported good at Bryan, but Art Smith was flying in a blinding snowstorm at the time of the crash.

Art Smith began flying when he was 16. He was encouraged by his parents, who mortgaged their home in Indiana for $1,800 to furnish capital to build a plane.

His first flight wiped out what it took Smith six months to build. Undaunted by the crash, in which everything but the engine was wrecked, Smith built another. This time he was successful and earned enough money from exhibition flights to pay off the mortgage. In a few years he had acquired a national reputation.

When the United States entered the World War, Smith became a civilian test pilot and instructor, and helped in the design of several new planes. He joined the Air Mail Service on April 1, 1923, and has been flying in the Eastern Division since.

United States Civil Service Examination

The United States Civil Service Commission announces open competitive examinations for the positions of associate aeronautical engineer, salary, $3,000; assistant aeronautical engineer, salary, $2,400.

Receipt of applications for these positions will close April 30. The first rating of papers will begin March 15, 1926; thereafter, papers will be rated as received until the close of receipt of applications.

The examinations are to fill vacancies in various branches of the Government service throughout the United States.

The entrance salaries in the District of Columbia are those given. After the probational period required by the civil service act and rules, advancement in pay may be made, without change in assignment, up to $3,600 a year, for associate aeronautic engineer, and up to $3,000 a year, for assistant aeronautic engineer. For appointment outside of Washington, D. C., the rates will be approximately the same. Promotion from lower to higher grades may be made in accordance with the civil service rules as vacancies occur.

The duties of appointees will be in connection with original research or investigation, or design and construction.

Competitors will be rated on their education, training, and experience, on a scale of 100, such ratings being based upon competitors' sworn statements in their applications and upon corroborative evidence.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the board of U. S. civil service examiners at the postoffice or customhouse, any city.

The Swallow Co. in Production

Three Swallow planes have recently been sent to A B McMullen, Haynes City, Fla., who has the agency for the Swallows in Florida. Six more are on order, to be delivered by March 1. The Swallow Airplane Manufacturing Co also reports that they have signed a contract with Clifford Ball and Romer Wyant of McKeesport, Pa., for 30 planes for 1926. Ball and Wyant have the agency for Washington, D. C., and the following states: Pennsylvania, Ohio, New York, New Jersey, Maryland, Virginia, West Virginia, Delaware and North Carolina. This company is known as the Aircraft Sales Corp with offices in the Standard Life Building, Pittsburgh, Pa. Clifford Ball and his company recently purchased a flying field of 72 acres, between McKeesport and Pittsburgh, at a cost of $68,000.00. They will use Swallows for carrying passengers, and some of the new Swallow planes will be used for air lines that are being planned.

The Swallow company is shipping the balance of the five mail planes that are being built for Walter T. Varney, to Boise, Idaho, and will have them all ready to open the new mail route between Boise and Elko, Nev., by March 1.

New Air Mail Stamp Issued

On Feb 13, a new 10-cent Air Mail stamp was issued and placed on sale by the Post Office Department.

The stamp is a horizontal rectangle 75/100 by 1 84/100 in in size and is printed in blue ink. The central design represents a map of the United States, showing some of the rivers and mountain ranges. On each side is an airplane in flight, one traveling East and the other West. Across the top of the stamp, in white Roman letters, are the words "United States Postage," with the words "Air Mail" directly beneath. At the bottom of the stamp in shaded letters is the word "Cents" and in both lower corners are the white numerals "10". Ornamental plastic brackets appear at each side of the stamp.

The new air mail stamp will first be placed on sale at the post offices at Detroit and Dearborn, Mich., Chicago, Ill., Cleveland, Ohio and Washington, D.C. It will also be on sale at the Philatelic Agency, Division of Stamps, Post Office Department, for the benefit of stamp collectors and dealers.

Major General Sir Sefton Brancker, Director of Civil Aviation in the British Air Ministry. General Brancker arrived from England aboard the S. S. Valendam on Feb 20, for a visit to the United States. General Brancker has been very active in aeronautical spheres for many years. He was in charge of aviation at the beginning of the war under Lord Kitchener. He then became Commander of the Flying Corp under General Allenby with the Third Army. For 1½ years he was Deputy Director General of Military Aeronautics at the War office in England, and later became commander of the Flying Corp in the East, under General Allenby at the taking of Jerusalem. Upon the formation of the Air Ministry, General Brancker became a member of the council. And, since 1922 up to the present time, General Brancker has been Director of Civil Aviation in Great Britain.

AIRPORTS AND AIRWAYS

New England Notes

By Porter Adams

Word has been received from the Bangor Chamber of Commerce saying that they have secured the necessary number of members to organize a local chapter of the National Aeronautic Association. The organization meeting was to be held on Thursday, Feb 11, with a banquet meeting, at which time the Hon. W. H. Gannett, Governor of the Association for the State of Maine, and Col. Francis H. Farnum, President of the State of Maine Chapter of the National Aeronautic Association at Augusta, were to be the guests of honor.

There is, at the present time, much activity in Bangor in regard to aviation and plans are already under way for the establishment of an air line which will connect Bangor with the Boston New York air route. The heavy snow storm which hit New England last week did not, however, stop flying from the Boston Airport for the Army and National Guard planes flew 8 hr 35 min. On Sunday, Feb 7, a Curtiss Oriole with a C-6 engine came up from Curtiss Field, N. Y. and landed at the Boston Airport to get pictures of the survivors of the S.S. Antinoe who were brought into Boston on the Carmania. It returned to New York Monday morning.

One of the Airport Jennies has been rigged up with skis and the crew were kept busy getting the drift of snow away from hangar doors so that they could take the winter ship out and give it a trial.

Lieut. A. E. Jones, instructor of the Massachusetts National Guard pilots, flew 4 hr. last week and carried as passengers, Capt. L. C. White, the flight surgeon at the Airport and Surgeon Leonard Cort. He did the flying on Tuesday and Wednesday.

A few days ago, Lieut. Harold R. Harris, formerly chief test pilot at McCook Field, arrived at the Airport and borrowed a DeHavilland for a flight to the end of Cape Cod and back. Harris, who is on leave of absence from the Army, has been working on crop dusting and spraying of trees. He took with him, on the flight, Mr. Barnes of the Department of Agriculture and it is believed that their flight to the Cape may be to look over the prospect of doing crop dusting work there, this summer.

The Navy did no flying during the week Feb 1-7, either from the Naval Reserve Air Station at Squantum or with their land Jenny at the Boston Airport.

Boston learned with great regret and sorrow that the efforts to retain Lieut. Robert J. Brown, Jr., Commanding Officer of the Boston Airport, on duty, have been unavailing and that Brown is due to leave from New York on April 20, for Honolulu. So far, no relief has been appointed to take Brown's place as commanding officer of the Airport but local sentiment is very strong for Capt. Christopher W. Ford, who is at present Assistant Air Officer of the First Corps Area.

Dan Sayre, President of the Boston Airport Corporation, is, at present, in Wichita, Kan., where he has been on business at the Travel Air factory. He is expected to return to Boston within a few days.

Another visitor was J. T. Trippe, of the Colonial Air Transport Company, who was in town for a few days during the week.

Lenoir, N. C.
By Sid Malley

It is indeed gratifying to see the stride flying has taken in this section of Western North Carolina. The Lenoir Aero Co., with field and headquarters at Lenoir, operating a Waco airplane, flying passengers, special passenger transportation in and out of the state, pictures, aerial surveys, etc., made 612 flights, 123 cross-country flights, carrying a total of 1203 passengers, 287 hr. flying time.

A flight made by the writer, in October, from Lenoir to Columbus, Miss., a distance of approximately 620 mi. is worthy of note. Leaving in a downpour of rain and in a strong head wind at 9 45 a. m., after fighting against rain, wind and storm, every inch of the way we landed at Roberts Field, Birmingham at 3.50 p. m. Leaving Birmingham the following morning, at 10 00 a. m., with a strong tail wind in our favor, landed at Columbus at 11 30 a. m. The flight back was made in less time but was extremely cold.

The reorganization of the Lenoir Aero Company is being perfected under the name of the Aero Engineering Co. The new company plans to carry out aerial surveys in the southeastern states, there being a large field in the city. County mapping as well as private development work and preliminary surveys for the assistance of practicing engineers, will be carried out.

The new company just completed and turned over to the town, an aerial survey of Lenoir. The city officials report the map is satisfactory in every respect. Maps have been made in and around Asheville, N. C., of several developments and of drainage districts, etc.

Lenoir has one of the best fields in the state, surrounded for miles on all sides by emergency fields, these being located in the valleys of the Blue Ridge mountains and foothills. The field at Lenoir is located one mile east of the town. It runs Northeast and Southwest, with excellent approaches at the ends. The runway is about 1600 ft. long and between 800 and a 1000 ft. wide. A service station and phone are located one block West. Pilots, who fly over this section, are invited to land (without any charges) and transportation to the town will be provided and arrangements made in servicing their planes.

Another company is located here, headed by Harry Herman, who is flying a rebuilt streamlined Jenny. He is doing quite a bit of flying.

Brea Air Club

High school girls in Brea, Cal., have been playing hookey to take flying lessons, according to a complaint filed with the commodore of the Brea Air Club. The truant officer finds that the airport, on the edge of town, has too many attractions and asks the co-operation of the pilots and officials in discouraging instructions during school hours. Three ardent flying enthusiasts are shown above. From left to right they are Lillian Trumbridge, Nadine Mason and Maude Anderson.

Cincinnati, Ohio
By Kenneth D. Stern

Official recognition of Lunken Field, the new Cincinnati government reserve airport, was recently taken when the Army Air Service placed it on its Model Airways system as a stop-

ping point on the airway between Dayton, Ohio and Louisville, Ky

Ships flying on the regular Model Airways schedules several times a week will make the field a stopping point for reserviceng, starting Feb 1

The new field, which is in the form of a rough rectangle, nearly a mile on its longest side by half a mile on the other, was opened last summer and is commanded by Maj Edward L Hoffman, U.S.A.S When moved from its old location at Grisard Field, Blue Ash, Ohio a suburb of Cincinnati, in July 1925, only one hangar of the government station was in existence

This was moved to the new location, which is well within the city limits, a distance of only five miles from the heart of the business district, and can be reached by street car in half an hour and is within fifteen minutes of the Post Office, for air mail facilities.

During the fall and winter, an additional hangar has been erected and a combination field office, officers club rooms, barracks for visiting fliers and supply depot for the field, have been erected.

The roof of the two story frame barracks has been equipped with floodlights for illuminating the field in front of the hangars for night landings and the color scheme of the newest hangar, a vivid orange hue which can be seen from a great distance and enhances the visibility of the field (an experiment of Major Hoffman's) was favorably commented upon recently in a letter from Maj Gen Mason Patrick to Capt John W Pattison of the Lunken Field Company

With but $7,000, of the $35,000 needed for the improvement of the field, donated by popular subscription collected last year remarkable improvements have been made by Major Hoffman in the work of actual construction

With additional funds, plans, which have been made for further grading of the field and an erection of a hangar for the housing of civilian planes, will be gone ahead with

The formal dedication of the field will take place early in the Spring, with an air circus

Higby Embry and Paul Riddle of Cincinnati have formed the Embry-Riddle Company and have taken over the distribution of Wacos for Ohio and Kentucky and are making Lunken Field their base of operations.

Cleveland, Ohio

By J Sullivan

All of the boys are heldup for the winter, with the exception of Ralph F Thomas, Manager of the Cleveland Air Service, Inc, known in these parts as "The Snow-Ball Flier," —at present, anyway Mr Thomas has had his Standard in the air practically all winter, giving instruction to one of the finest classes in the country The boys all seem to take to winter flying fairly well Mr Thomas is also giving instruction to a fair young lady, none other than Miss Hazel Hills, of Reneve, Pa She takes very readily to winter flying, and, so far, has not made a kick on some of the coldest weather mornings that we have had She sure shakes a mean control stick. More power to her. A few more in the aviation game with her enthusiasm would be a great help to the game The big "Ford Hangar" is getting along very nicely on the Brookway Mail Field The Ford and Air Mail Fliers have missed but very few trips, and have flown through what modocks called "Impossible Weather"

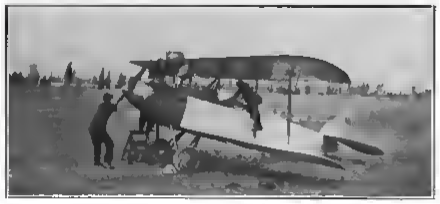
"Bill" Weik, is getting his Standard polished up He plans on a very early start in the Spring J Dunkle, known as the "Original Flying Dutchman," dropped his anchor in Cleveland last fall and, at present, is completely rebuilding an S V A with which he intends to terrorize the Angles early in the Spring

Los Angeles

This airport is the home of the 115th Observation Squadron, 40th Division Air Service, California National Guard. Under rules which governed the granting of Griffith Park as an airport, it is forbidden to use the field for commercial purposes. It had been planned to use it for the terminal of Air Mail Service. Up to the present time, the City Council, the Park Board and a lot of Civic bodies cannot decide whether to allow it to be used for that purpose or not. If they do not decide soon they are liable to find the air mail bidder using some other airport.

Lieutenant Arnold, the round-the-world flier, is now in charge of the instruction of the National Guard Unit.

On Jan. 17, an artillery spotting maneuver was ordered. Captain Jeffers and Lieutenants Graham, Claiborn, James, Burrows and Remlin, with observers, took off and circled the target from an altitude of 3000 ft. A group of men, with



Staff Photo
Waco getting ready to take off from the Pine Valley, N. J. field of the Ludington Exhibition Co.

Lieutenant Arnold's eagle eye on them, touched off the "Shell bursts." Everything worked out satisfactorily.

Lieutenants James and Remlin flew over to Clover Field and a challenge was issued by the enlisted men of the 115th to the Reserve Squadrons at Clover Field. The challenge covered everything from foot racing, foot ball, base ball on down to dice for money, marbles or chalk.

Lists France First in Air

A chart published Jan. 20 by the British Air Ministry gives France first place among nations of the world in aviation, giving to Frenchmen forty-five world's records against thirty-three for Americans. Italy is placed third with twenty-four records, while Denmark and Holland are tied for fourth place with two each.

The Air Ministry's figures indicate that in 1924 the United States led the world with fifty-three aviation records, France being second with twenty-seven.

Reckless Airplane Pilot Arrested

A recently enacted law against reckless airplane piloting was used for the first time in Santa Monica on Jan. 31. Earl T. Montgomery, a motion picture director, was arrested at Clover Field. He was charged with "wilfully and unlawfully operating an airplane in the air in a reckless manner, endangering the lives of persons not occupants of said aircraft."

Fast Flight in OX5 Standard

Daniel Cowan of Ander, N. Y. purchased a Standard from the Robertson Aircraft Co. of St. Louis, and, in company with Clifford Condit, who recently soloed with the Heath Airplane Co., after only 3½ hr. instruction, flew the ship back to Chicago, making the approximate 300 mi. in 3 hr. They followed the C & A tracks and skipped from town to town.

They stopped at Dwight, Ill. for gas and received courteous service from the Standard Oil Company there. Taking off again into a 50 mi. South wind they ascended to 1,000 ft. without moving from the spot, thus breaking all previous helicopter records. At this altitude they again turned North and proceeded without further stop to the Heath flying field at Chicago.

United States Air Forces

Successful Test of New Balloon Rip Panel

A free balloon flight was recently made from Wright Field, Fairfield, O., by Lieut. Ira R. Koenig and Sgt. Wm. J. Bennett, in order to test a new and improved rip panel which was designed by the lighter-than-air section at McCook Field. Rip panels are strips of balloon fabric, eight or ten inches wide and fourteen to sixteen feet long. They are attached to the balloon bag and are used for quick deflation when the balloon lands. The old type of rip panel was fastened to the balloon with cement only, the new type has a row of snap fasteners in addition to the cement, thus increasing the safety of balloon flights.

Lieut. Koenig and Sgt. Bennett left Wright Field at about 9.00 a.m. and landed at Washington Court House at 2.00 o'clock in the afternoon, the new rip panel functioning perfectly at the landing.

Model Airway Statistics

Of the 465 flights attempted over the Model Airway during the fiscal years 1923, 1924 and 1925, 448 were completed. The total number of hours flown was 9,796, involving 797,740 miles. No fatal accident marred the operation of airplanes over the Modal Airway during these three years. A tabulation furnished by the Modal Airway Control Office, Fairfield Air Intermediate Depot, gives the following information for each of the three years mentioned and for July to November, 1925, inclusive, viz:

	1923	1924	1925	July to Include Nov. 1925
Flights started	147	143	175	110
Flights completed	144	138	180	104
Hours flown	2 088	3 107	4,575	2 026
Passengers	128	225	342	280
Pounds Express	1 775	13,746	27,485	5,063
Crashes	3	4	7	2
Accidents	–	–	1	–
Fatalities	–	–	–	–
Flights abandoned (excluding crashes)	–	1	–	–
Gas consumed (gals.)	73,730	65 289	95,982	48 847
Oil consumed (qts.)	13 828	14 727	20 206	12 143
Flights cancelled	8	8	11	–
Forced landings	18	22	28	26
Miles flown	137,160	264,800	388,750	142 457
Delays	105	117	113	122

Obstructions at Langley Field, Va.

The Hydrographic offices announces that all pilots flying to Langley Field should take care to avoid the trolley lines which are being installed on each side of the field, extending from the heavier-than-air hangars to the lighter-than-air hangar. These wires are supported by poles and are about 20 ft. above the ground. At a later date the poles will be painted a distinctive color and will be lighted by electric lights. This is impracticable during the period of installation.

Army Air Orders

Capt. Edgar P. Sorensen, A.S., Kelly Field, to Brooks Field.

First Lieut. Earle H. Tonkin, A.S., Kelly Field, to Washington.

First Lieut. Edward H. Wood, Middletown, to Kelly Field. Resignation of John Parker Van Zandt, A.S., accepted.

First Lieut. Perry Wainer, A.S., will report in person to Com. Off., A. & N. Gen. Hos. for observation and treatment.

Sec. Lieut. George B. Peploe, A.S., Brooks Field, to Fort Sam Houston.

Spec. Or. 283, directing First Lieut. Leslie P. Arnold, A.S., to assume duty as Com. Off. Los Angeles Air Port, revoked.

Sec. Lieuts. A.S., Henry G. Fisher (Inf.) and John P. Kirkendall, relieved from present duties Scott Field and will report to A.S. Balloon and Airship School for training.

Capt William B Wright, jr, A S, relieved from present duty A S Fly Sch, Kelly Field, and will report to Com. that school for duty

Capt Raymond E O'Neill, A S, off Ch of A S, Washington, to Brooks Field

First Lieut. Pardoe Martin, A S, Brooks Field, to San Francisco, sailing Apr 2 for Hawaiian Dept

Sec Lieut George F Schulgen, A S, Selfridge Field, to New York City, sailing March 12, via Govern transportation, for Philippine Islands.

First Lieut Roy W Camblin, A S, to Brooks Field, upon completion of present tour of foreign service

Private Wallace R Cramond, A S, Langley Field, to Mitchel Field

Private Ralph O Jolly, A S, Mitchel Field, to Langley Field

Sec Lieuts, A S, Harvey Kenneth Greenlaw and Hugo Peoples Rush, promoted to rank of First Lieuts., and will continue in present duties

Sec Lieut Paul Dupee Wilson, A S Res., Dayton, to active duty McCook Field, reverting to inactive status Feb 15

First Lieut Reuben D Biggs, A S, office of Chief of A.S, Washington, to Buffalo

Spec Or 305, assigning First Lieut. Mark H Redman, A.S, to Chanute Field, revoked.

First Lieut Earle J Carpenter, A S, detailed as A.S. instructor, Penn Nat Guard, Philadelphia, to take effect upon completion of tour of foreign service.

Transfer of Sec Lieut Hubert W Ketchum, jr, A S, to Cav. announced. Lieutenant Ketchum is relieved from duty with Sec Div., and is assigned to First Cav Div, Fort Clark

Spec Or 297, relieving Sec Lieut John K Nissley, A S, from present duty at Langley Field, and ordering Lieutenant Nissley to sail on Apr. 22 from New York for Hawaiian Dept, revoked.

Capt Calvin E Griffin, A S, Rockwell Air Int Dep, Rockwell Field, detailed for duty with the Org Res of Ninth Corps Area

Sec Lieut Walter D Webb, jr, A S (Inf), relieved from detail in the Air Ser Prim Fly Sch, Brooks Field, and is attached for duty with the Sec Div He will report at Fort Sam Houston

Sec Lieuts Charles H. Valentine and Joseph K Gibson, A S, relieved from duty with the Air Ser Prim Fly Sch, Brooks Field, and are attached for duty with the Sec Div, Fort Sam Houston

Sec Lieut Arthur C Boll, A S, relieved from duty with the Air Ser Prim Fly Sch, Brooks Field, and attached for duty with the Sec Div., Fort Sam Houston.

Capt Charles Ellbridge Cox, jr, A S Res, Brooks Field, to Indianapolis, reverting to inactive status.

Maj Benjamin G Weir, A S, office of Chief of A S, to New York City

Lieut Joseph T McNarney, A S, Fort Leavenworth, to Washington

Maj John D Reardon, A S, relieved from duties Army War Col, Washington, and assigned to duty with War Dept. Gen Staff

Capt Ralph H Wooten, A S, appointed acting quartermaster in office of Chief of A S

Navy Air Orders

Lieut Comdr Maurice R Pierce det U S S Los Angeles, to Aircraft Sqdns., Scrg Flt

Capt Robert W McNeely det. Bu Eng, to temp duty Nav Air Sta, Pensacola.

Orders Dec 14, regarding Lieut Comdr DeWitt C Ramsey, modified Lieut Comdr Ramsey to Airef Sqdns, Scrg Flt

Lieut. Meinrad A Achur det. Bu Aero, to Aircraft Sqdns, Battle Flt

Ensign William V. Davis det U S S Idaho, to temp duty Nav Air Sta, Pensacola.

Mach William Hartner to continue U S S Trenton, Or Dec. 16, to Nav A Sta., N O B, Hampton Roads, revoked

The Aeroplane

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Editor

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PUBLISHER'S NEWS LETTER

Occasionally these letters have a personal tone that may be overlooked in this out-of-the-way part of AVIATION. This week, we are letting you into a very pleasant secret. On one of the closing days of March the writer of this page expects to start on a trip that is hoped will give every reader of AVIATION a closer knowledge of air transport in Europe. If it is possible to travel over the main air routes of Europe in a two months visit it will be done and every reader can be assured that he will get the sort of information that AVIATION gives, and by that is meant, not glowing descriptions of scenery and the usual facts that only newspapers print, but those details that will fill in the gaps that have been held out of many of the reports that have been made by returned air tourists. It has always seemed to us that those who wrote on air transport in Europe either wanted to overstate their case or were so carried away by superficial appearances that they neglected to give some of the fundamental reasons why the great development abroad has progressed so rapidly, and made unfortunate comparisons with the apparent backwardness in this country.

* * * *

A story will illustrate the spirit in which the trip will be made. An old maid went to a bird store to get a little winged companion to cheer her in her lonesomeness. She chose a small canary and with its cage on her arm started to leave the store. As she neared the door she heard a voice say, "Oh, why don't you take a real fellow with you?" She saw a poor old pol parrot looking longingly at her and decided to take it home too. When she reached her third floor back, she put the little canary on the dresser and the parrot over in a dark corner. When she was preparing for her nightly sleep, the little canary made a brave effort to be cheerful with a faint, "Peep peep". But from over in the corner came, "Oh h---, I'm going to take a good look." And that is just what we hope to do while on this most interesting trip.

* * * *

There have been so many indications of hospitality awaiting such a visit that it is possible that some exceptional opportunities may be presented to get a close-up of some of the developments that the casual visitor does not see. While the trip is continuous grind since leaving the Air Service after being made to secure a much needed rest after the armistice, there will be little rest if the schedule planned is completed. But it will always be remembered that the eight thousand subscribers and many thousand more readers of AVIATION will be looking through the two eyes, that will try to put on as wide angle lenses as possible. As there are many changes that will have to be made in plans after arrival, the less said at this time about the various routes that it is hoped will be covered, the greater will be the interest if all the trips are made.

* * * *

Air transport will not be the only side of aeronautical progress observed, but, if possible, the tendency of governmental aviation from the standpoint of organization will be noted and given from an independent point of view. The aircraft industry of each country will be visited, as much as time will allow, and the latest types of aircraft will be studied with the hope that you will be given some new ideas of what the engineers are working toward. And of course the editor of "Who's Who In American Aeronautics" will try to make you better acquainted with some of those who are making aeronautical history overseas. As will be evident, there may be a danger of acquiring a case of aeronautical indigestion but our friends Charles Grey of the Aeroplane and Capt. Henri Bouche of L'Aeronautique were able to survive the hospitality of their American visits. Perhaps the difference in the laws may have a sustaining influence.

* * * *

And of course the subject that has every pilot in this country guessing, namely aircraft regulation, will be given the most careful attention. "A sharp differentiation will be made between subsidised air transport and aerial service and the effect of the laws abroad noted. It is believed from the best of information obtainable that those who may be charged with the regulation of aviation in this country, if any of the bills now under consideration pass Congress, are disposed to profit by the mistakes of European countries and not make such strict rules as is anticipated by so many of the pilots who have written so interestingly to AVIATION. Perhaps these letters have had some effect. We know that they are being studied with the most sympathetic consideration. As it is not expected that any sudden change will take place, perhaps once more we can make available facts that may temper the edge of any regulatory measures. In any event, it is hoped that each of our readers will share even though through so poor a medium as the printed page some of the interesting as well as pleasurable experiences of the "flying visit".

—L.D.G.

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FOR SALE Special Lincoln Standard, 150 Wright "A" motor with tools and spares Carries extra wheel, nickel-plated turn buckles, baggage compartment and 48 gals gas. This plane new last Fall, had 12 hours flying Dual control. Now stored in hangar at Selfridge Field Immediate sale price $1650 Wire or write Lt C W Brown, 2002 Real Estate Exchange Bldg, Detroit, Mich

FOR SALE Canuck, good, just overhauled completely Upholstery front cockpit covering sides, tank and seat. Carries two in front A money maker Will demonstrate, $900 Special Farman Sport 70/80 Anzani, two seater. Bargain, $2,000 Also Farman Sport 50/60 hp Anzani, recovered, motor rebuilt, new pistons, gears, valves, etc., cylinder reground Blue and silver finish, fine two seater for sportsman, $1200 Also complete line Canuck fuselage struts, clip fittings, etc Ludington Exhibition Co, 816 Atlantic Building, Philadelphia, Pa

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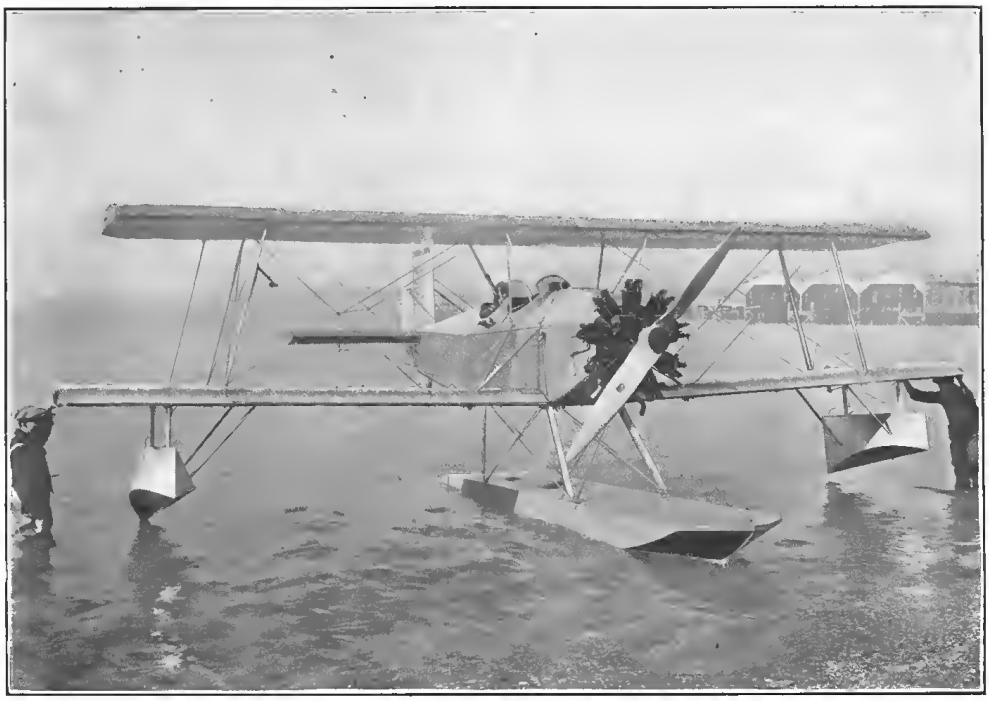

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